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June 19, 1961

Electrical World

The Electrical Industry's Weekly Magazine

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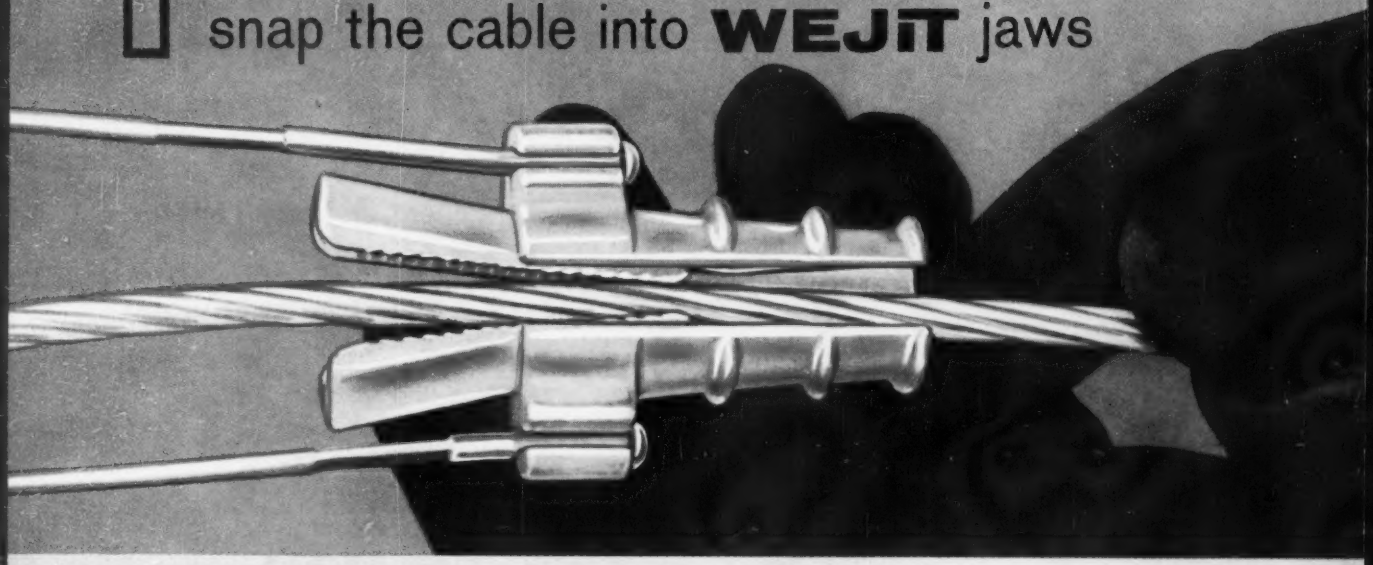

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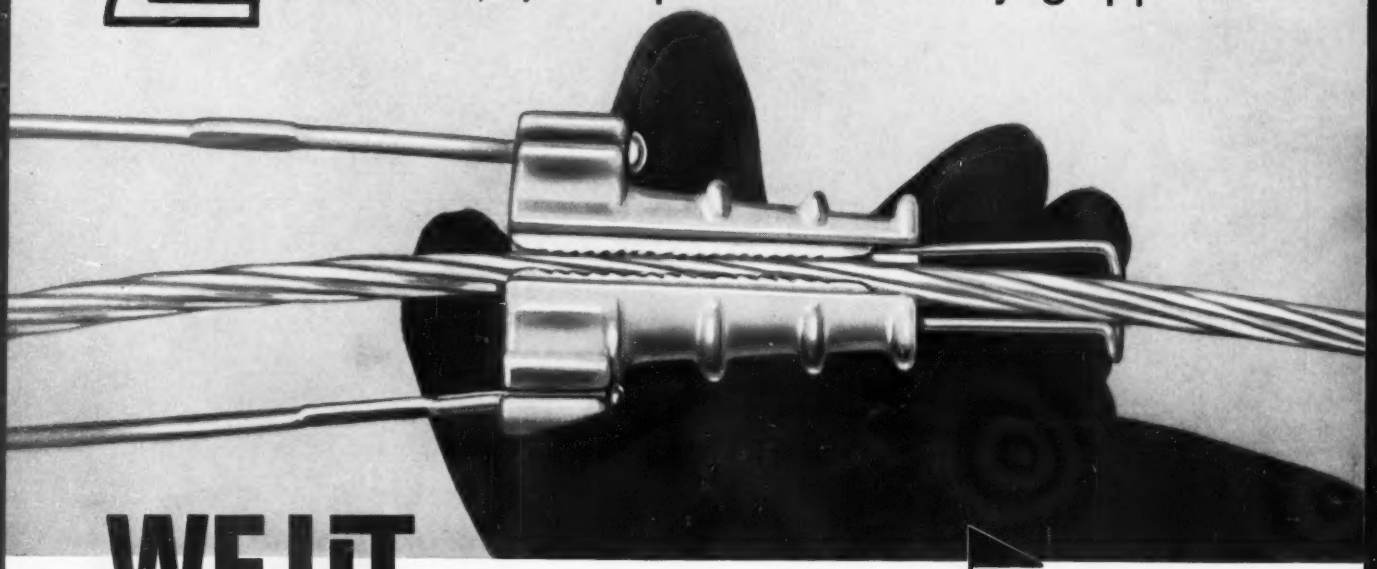

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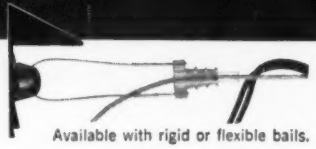

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Electrical World

June 19, 1961
Vol. 155, No. 25

Dateline . . .

Government Spends Against Future Surpluses

Washington, D. C.—While the majority of economic indicators continue to rise briskly, recording an industrial recovery far more spirited than most economists had expected, the government continues to plan new frontiers of federal spending.

Many observers are bewildered by this course. Since the late 1930's, the government has aimed at priming the pump when the economy was lagging, and cutting back on new expenditures as the indicators began to rise. But economic advisors in the Kennedy government, while taking satisfaction in the vigor of the upswing, have no intentions of cutting the flow of federal money to the economy.

The answer to this puzzle is that current economic thinking here has little in common with the pump priming philosophies of the past. Previous government economic activity concerned itself primarily with the short-term outlook. It almost echoed the words of Keynes, "In the long run we are all dead."

Administration economists now seem impatient with such a dictum. With the recovery now a fact, they have turned much of their attention away from the short-run, and are busy planning the long-term growth of the nation. Continued expansion of federal spending is an integral part of this long-term program.

Recent estimates indicate that the federal budget for fiscal '61 will be $3 billion in the red, and that in '62, the deficit will climb to $3.8 billion. In view of these deficits, one pressing question is, "How is the government going to pay for the further expansion of federal programs?"

This, some economists and advisors are telling the Administration, isn't a problem. Surpluses are inevitable in the future, and present deficits are simply borrowing against these future surpluses.

With the present tax structure, the thinking goes, and allowing for reasonable rates of unemployment, we are bound to have surpluses. This is because the bulk of our work force is shifting into higher income brackets. The more the breadwinner earns, the bigger the cut that the government takes.

But regardless of the reasoning, the Administration apparently feels that the money will be there in the future. And while it expresses concern about

(*Continued on page 5*)

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AFTER 30 YEARS ON THE JOB . . . Okolite insulation still looks good. This unretouched photograph shows a section of 11.5 KV power cable recently re-assigned by Duquesne Light Company. Notice that the insulation is still flexible and resilient—workable. Tests show the tensile strength has deteriorated very little, remaining more than 33% above the original specification figure.

How long does an Okonite cable last?

30-year-old Okonite cable still tests above specified values

Here's Okonite Cable'bility* at work. It's "Old Faithful"—a 1250 MCM, Okolite-insulated power cable, made by Okonite's *strip process* back in 1929, now serving reliably as a mine power feeder for Duquesne Light Company of Pittsburgh.

This time-proven cable started in service in the Roaring Twenties as an 11.5 Kv lead from switchyard to transformer, handling 15,000 KVA loads. By 1942 power demands had increased and the cable began fifteen years of full load operation, 24 hours a day.

Then in 1957, "Old Faithful" was replaced by a larger cable to handle a new 25,000 KVA load. At that time, the veteran Okolite insulation was pronounced perfectly suitable for the demanding tasks as a power feeder and was installed in its present location.

There are Okonite "Old Faithfuls" in use today in every application, providing circuit security for their users. That's because, as in 1929, Okonite still produces the most dependable cables available. The reason is Cable'bility*, which is synonymous with The Okonite Company, Subsidiary of Kennecott Copper Corporation, Passaic, N. J.

*OKONITE Cable'bility . . . cable craftsmanship since 1878.

***where there's electrical power . . . there's* OKONITE CABLE**

8273

Dateline . . .

Washington, D. C. (*Continued from page* 3)
the short-term effect of large deficits, it seems sure that these deficits will be covered by the future surpluses. Thus the pressing needs of defense, space exploration, and foreign aid may not take away from Washington's plans for new government forays into social programs (including electric power). The philosophy is that in the long run, there will be enough income to meet all the bills.

While looking chiefly to the long run, Washington experts are also busy studying the future arsenal of contra-cyclical devices. These may bear little resemblance to the devices of the past.

Foremost change in the future may be more emphasis on fiscal policy and less on monetary policy. Monetary policy was always preferred since action could be taken more quickly. The Fed could, for instance, change the re-discount rate quite swiftly. Changes in tax structure are a slow process.

But now the feeling is that the effectiveness of monetary policy is quite limited. America must now attempt to keep its interest rates in line with those of other nations or face another gold exodus. So, the Administration is studying ways to give the government the same flexibility with fiscal policy as the Fed has with monetary policy.

There are, as yet, no firm plans along this line. But some of the suggestions indicate just how sharp the break with the past may be. One idea is to give the president authority to eliminate income tax deductions for periods of one month. By using this power, he could increase disposable income any time the economy seemed to need stimulation.

From such ideas, suggestions, and assumptions, one fact emerges. The Administration will leave no stone unturned in its efforts to promote stable, long term growth. It seems untroubled by the thought that imaginative thinking, carried too far, may lead to disaster instead of prosperity.

Letters

No Approval in Washington

To the Editor:

On page 85 of your May 15 issue is a tabulation of rate increases granted in 1960, which shows Pacific Power & Light as having received increases in Washington as well as Oregon. In order that your records may be corrected, it should be pointed out that no rate increase was obtained in the state of Washington.

The commissions of the two states in companion proceedings held to essentially the same measures of rate base and allowable rate of return. By these standards, Oregon earnings were found to be insufficient at the then existing level of rates, while the Washington Commission made a finding that earnings already were adequate and denied the requested rate adjustment.

John Dierdorff, Vice President
Pacific Power & Light Co
Portland 4, Ore.

▶ A recheck of our own records confirms your assertion that an error crept into our rate roundup story. We very much appreciate your effort in setting the record straight.

Not an Electric Increase

To the Editor:

In your May 15 publication, you refer to rate increases pending which includes this company in the amount of $615,000. According to the information shown on page 85 of your publication, this was the utility rate picture at the end of 1960.

The $615,000 rate increase referred to in your publication is a gas rate increase which was filed in January, 1960. The hearings on this case were completed May 11, 1960, and on August 12, the Public Service Commission of Indiana approved the company's request for an increase in an amount of $485,609. This was approximately a decrease of $130,000 in the company's request. The new rates became effective August 24, 1960.

We thought it advisable to call this matter to your attention.

G. R. Woehler
Vice President and Comptroller
Southern Indiana Gas & Electric Co
Evansville, Ind.

ELECTRICAL WORLD
Vol. 155, No. 25 June 19, 1961

Published weekly by McGraw-Hill Publishing Co., Inc., James H. McGraw (1860-1948), Founder. **Executive, Editorial, Circulation and Advertising Offices:** McGraw-Hill Building, 330 West 42nd Street, New York 36, N. Y. Printed in Albany, N. Y.
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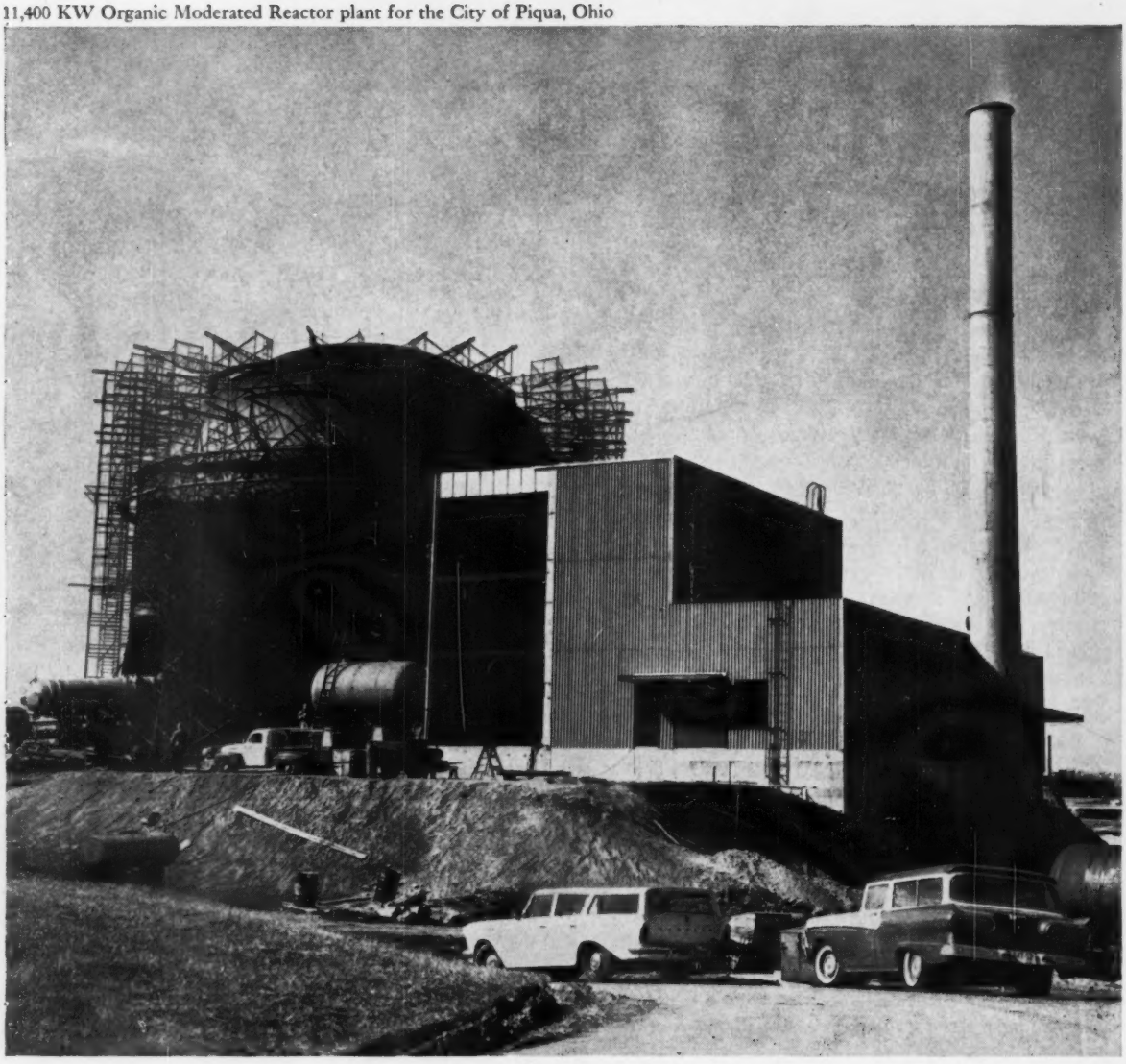

The Peaceful Atom

Answering the challenge of the Sixties: to double the world's power output in ten years

To meet increased living standards everywhere, the world's power resources must be doubled in the 1960's. In this great expansion the Peaceful Atom will play an ever-increasing role. Atomics International, a leader in developing nuclear power for over 15 years, is already building two of the world's most advanced power stations under AEC programs: the Organic Reactor plant at Piqua, Ohio and the Sodium Reactor plant at Hallam, Nebraska. Another promising concept is the Advanced Epithermal Thorium Reactor project, now being developed by AI for the Southwest Atomic Energy Associates, a group of investor-owned utilities. AI's experience and facilities will play a growing part in meeting the power challenge of the Sixties.

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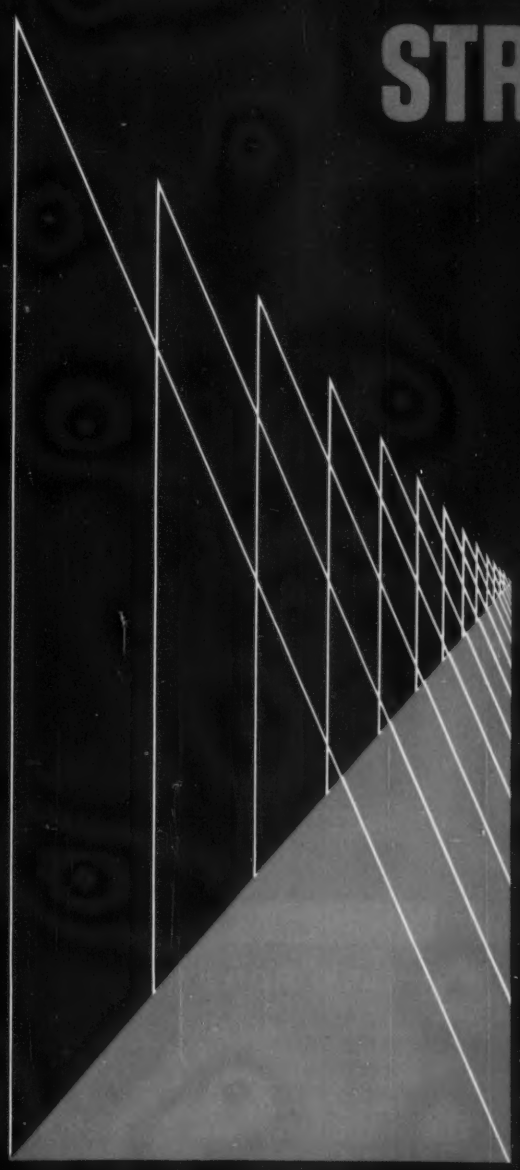

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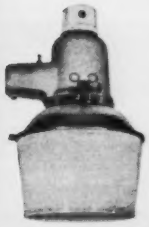

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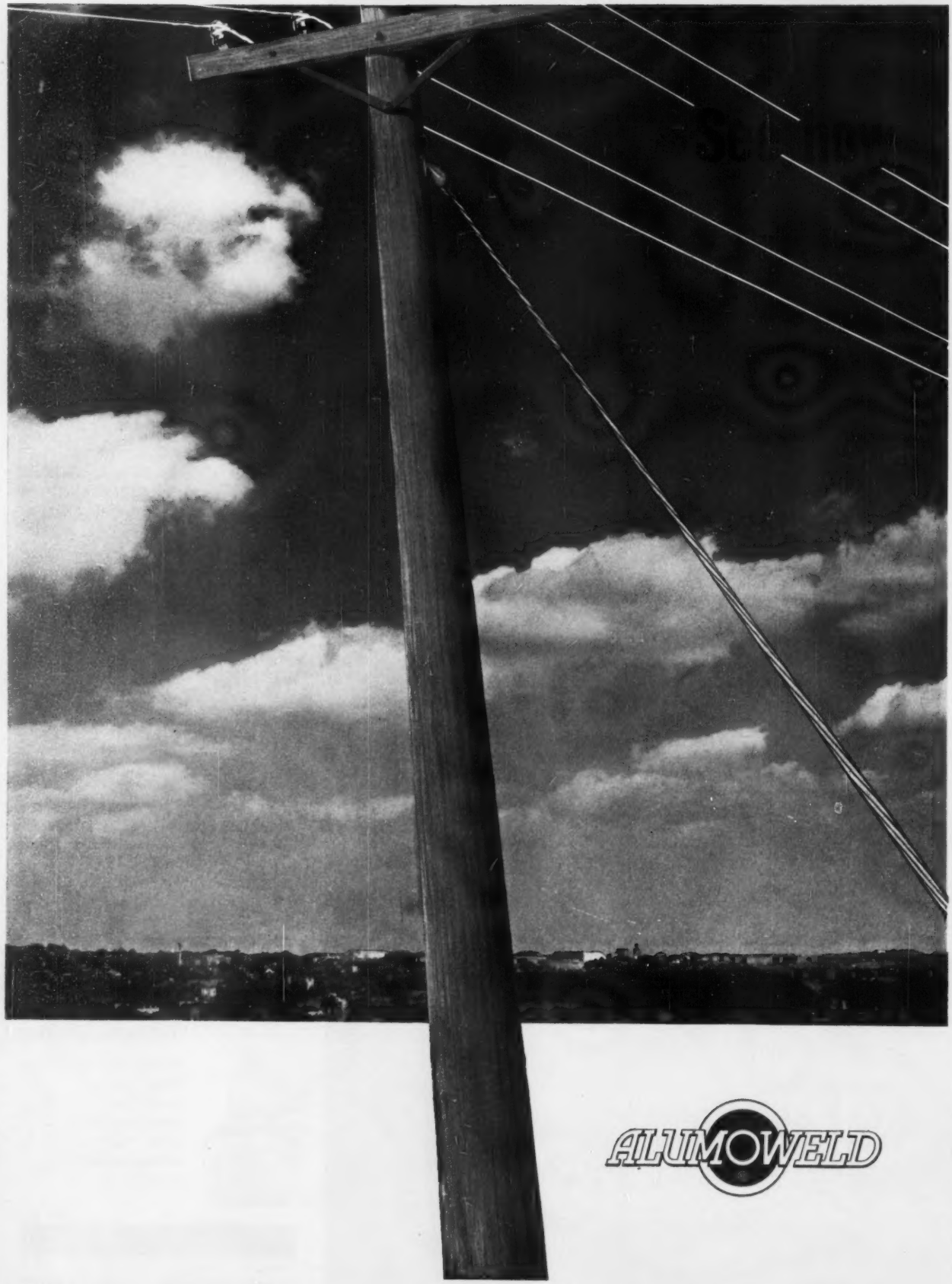

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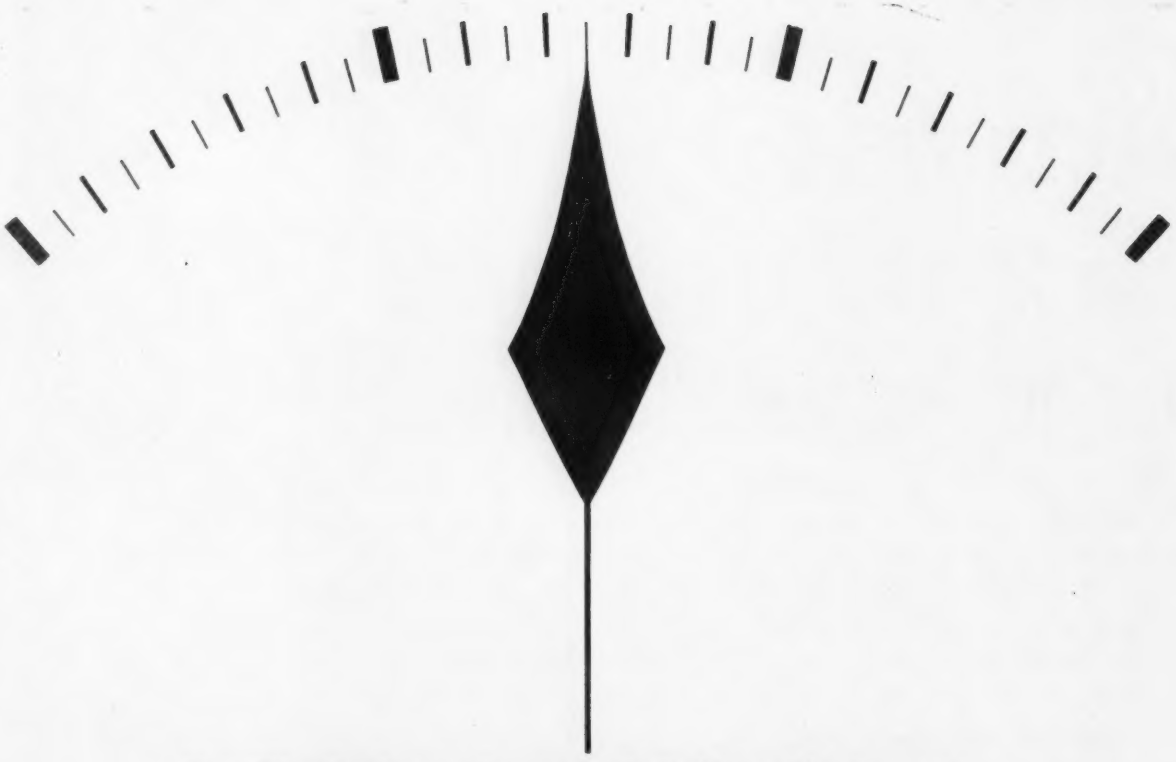

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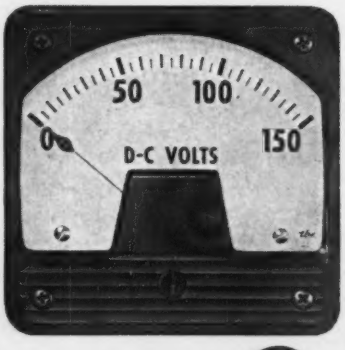

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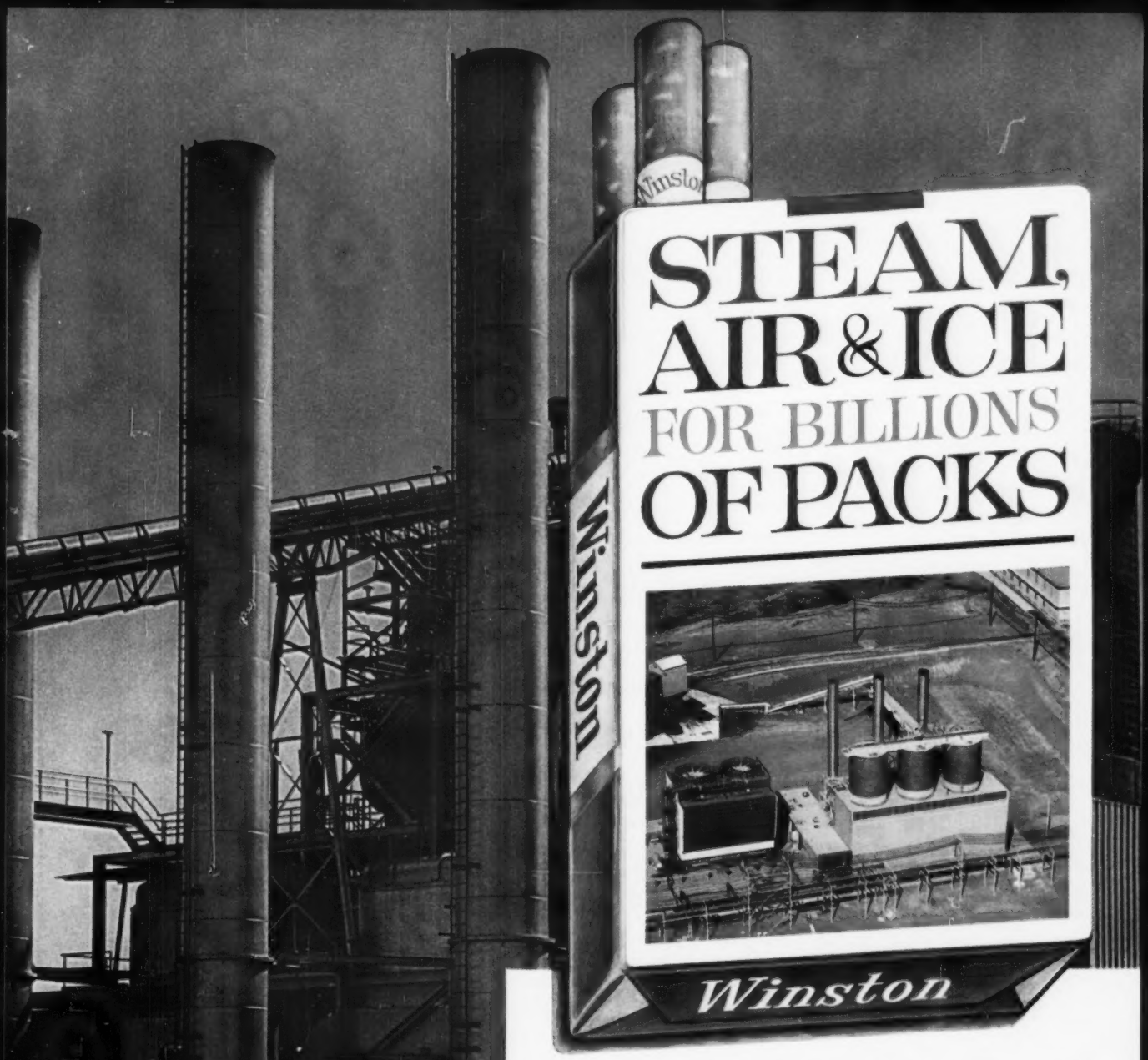

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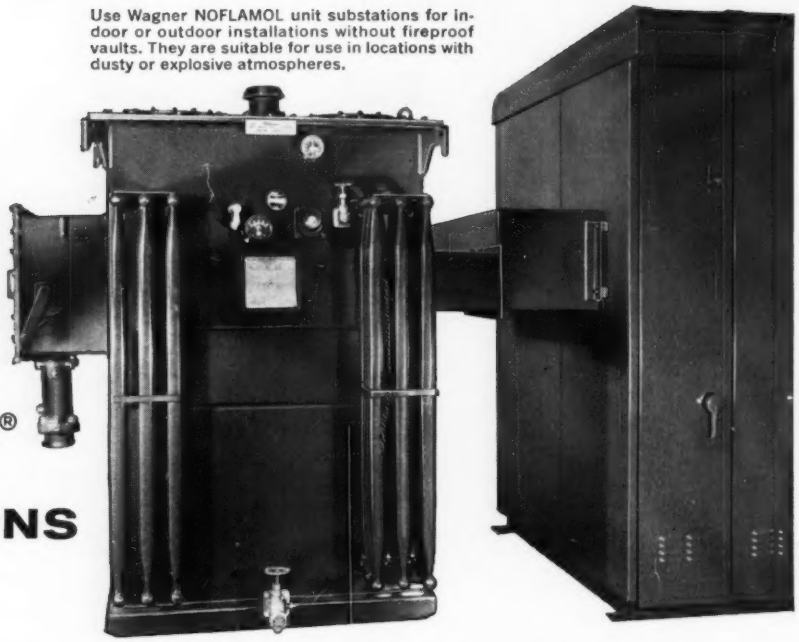

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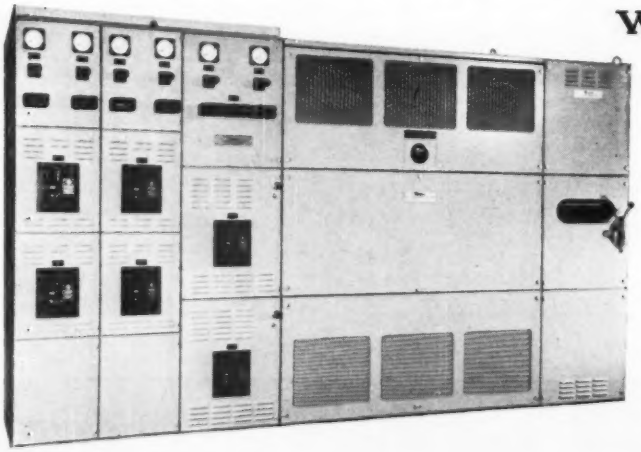

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Electrical World

JUNE 19,1961
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The Electrical Week

LATE NEWS ▶ **Investigation by Public Service Commission into New York City's 4½ hr power** blackout is called for by Mayor Robert Wagner who asserted that "frequency of power failures at times of great current demand is frightening." (See p 48.)

Joseph C. Swidler and Howard V. Morgan are confirmed by Senate to be members of the Federal Power Commission. Confirmation of President Kennedy's nominees comes after bitter, partisan debate over Morgan's fitness for the post. Vote for Morgan was 55 Democrats and two Republicans for, and 26 Republicans and one Democrat against. Swidler, who is Pres Kennedy's selection as FPC chairman, is confirmed by voice vote, with only Sen J. Strom Thurmond (D-S.C.) identified as opposing. Swidler's confirmation is expected to open bitter controversy over the chairmanship, currently held by Jerome Kuykendall, who has expressed no intention of giving it up.

National Emergency Alarm Repeater (NEAR) chief, Brig Gen Wendell H. Deplantis, strives to retain position until NEAR project is farther along. As a Schedule C civil service employee, in a policy position, he is subject to removal by the new Administration. He has requested, and will receive, an OCDM hearing.

Wheeling rate concessions are offered by Pacific G&E to prevent government construction of transmission lines from California Central Valley Project. Robert H. Gerdes, executive vice president, tells the House Appropriations Committee the rates offered by the company would cost the government less than building and operating its own lines.

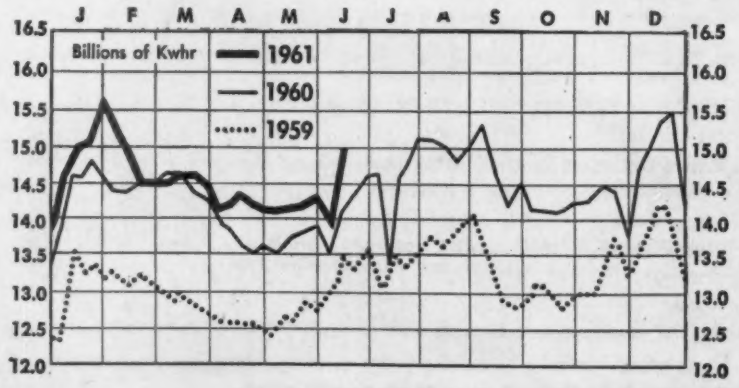
City of Cleveland decides to accept second round of identical meter bids totaling $68,691. A spokesman says the city "will almost certainly award" the bulk of the order to Westinghouse, the rest to GE.

REA has finally approved a $60,225,000 loan, largest in REA's history, to Hoosier Cooperative Energy, Inc, of Osgood, Ind., for a 198-Mw coal-fueled steam plant near Petersburg, Ind., and about 1,500 miles of 154 and 69-kv transmission line and substation.

New assistant administrator of Bonneville is Charles W. Kinney, who has served four years with TVA and 21 years with Corps of Engineers. Eugene C. Starr is re-appointed chief engineer.

WEEKLY POWER OUTPUT—Up 6.1%

(Week ending June 10), Kwhr 15,004,000,000



Percent Change From Previous Year

	May 27	June 3	June 10
Total U. S.....	+ 3.2	+ 2.8	+ 6.1
New Eng.	+ 6.6	+ 4.8	+ 9.2
Mid. Atlan. ...	+ 3.8	+ 2.9	+ 7.7
Cent. Indust...	+ 1.9	+ 1.0	+ 4.0
West Cent.....	+ 2.2	+ 3.9	+ 7.9
Southeast	+ 2.8	+ 4.2	+ 8.9
South Cent....	+ 4.8	− 0.4	+ 2.1
Rocky Mount...	+ 9.3	+ 7.5	+ 3.1
Pacific			
NW	− 3.7	+ 4.9	+ 6.7
SW	+ 8.0	+ 2.9	+ 4.6

Seasonally Adjusted Index 293

Week Ago 282 Year Ago 277

Source: Edison Electric Institute

Supply Lines

WHAT'S BEHIND THE GOVERNMENT'S THREAT TO TRY TO BREAK UP GE?

The struggle between the US Justice Department and General Electric Co over the wording of the consent decrees in the Philadelphia civil antitrust cases (EW, June 5, p 43) has reached such an impasse that last week GE felt compelled to employ an old Washington gambit—a planted leak to two newspapers, the New York Times and the Wall Street Journal. As a result, the front pages of both of those newspapers carried stories June 12 to the effect that the Justice Department had threatened to try and break up GE through a divestiture suit if GE didn't sign the Department's version of the consent decrees.

The issue between the two protagonists is still the same, whether GE will sign consent decrees that bar the company from selling products involved in the Philadelphia cases at "unreasonably low prices," and put the burden of proof on GE should a disgruntled competitor in the future feel GE was in contempt of court.

The idea of breaking up GE into smaller components is not a product of the New Frontier. Actually its roots go back to the famous white sale of 1954-55 when a host of smaller companies complained to the Justice Department that the extremely low prices charged by the large companies were threatening to put these smaller electrical manufacturers out of business.

As a result of these complaints, the Justice Department in July of 1957 started an investigation into the electrical manufacturing industry. This probe had two general purposes. One was to see if there was any substance to the charges that GE and Westinghouse, through their actions in the white sale, were in violation of Section 2 of the Sherman Act, which prohibits attempts to monopolize.

The other purpose of the probe was to find out if there was any price fixing in the industry which would have been a violation of Section 1 of the Sherman Act. This phase resulted from complaints on identical bidding that had been coming in through the years from governmental buyers of electrical equipment.

Neither phase of this investigation ever got anywhere. But Justice Department lawyers got enough of a feel of the economics of the industry to convince themselves that price wars, which sometimes involved selling items below "cost," were more harmful to smaller competitors than big ones, and that this fact in itself could be detrimental to competition in the industry.

In the spring of 1959, when the Justice Department was making an analysis of its two-pronged probe, new identical bidding charges by TVA, coupled with prodding from Sen Estes Kefauver, caused the Department to reopen its probe of price fixing in the industry. The results of this investigation were the Philadelphia cases.

Shortly thereafter, the industry was again plunged into a low-price situation, and the Justice Department again started receiving complaints from more than two-score of the smaller competitors stating that the grand jury investigations and the resultant low prices were having an adverse affect on the economics of the smaller competitors and thus hurting, rather than helping, competition. But the Justice Department was too busy at the time with the price-fixing cases to do anything about these complaints.

Last fall, when the end of the price-fixing cases was in sight, the Department again started considering competition in the electrical industry as a two-fold problem:

to break up the cartels and at the same time to prevent price wars from destroying competitors needlessly.

The criminal cases in Philadelphia would solve the first problem. But how to solve the second? The Department felt it had two alternatives, both of which zeroed in on GE as the largest and most powerful company in the industry. The first was to try and break up GE by filing a divestiture suit under Section 2 of the Sherman Act. The remnants of GE, in the Department's thinking, would then not be able to sustain long periods of deep price cutting.

The second way (and by far the easier to accomplish), was to put a stranglehold on GE where deep price-cutting was involved by inserting a clause in the consent decrees that prohibited GE and the other companies involved from "selling at below cost". Because the second alternative would be quicker and easier to put into effect, the Justice Department decided to try for it, and to fall back to the divestiture alternative only if it failed on the consent decrees.

Thus, during the present negotiations, when the Justice Department threatened GE with a divestiture suit if it didn't sign the Department's version of the consent decrees, the Department was merely pointing out to GE that it had a second, previously determined tack to fall back on.

The big question mark is, however, whether GE would ever be broken up by a court. GE apparently thinks not, because at midweek it was prepared to go to trial rather than sign the consent decrees, and more importantly, face a divestiture suit if the government should file one. Another factor is that back in 1959, after the government's probe for Section 2 violations, it didn't file a suit, presumably because it didn't have sufficient evidence. Whether it does now remains to be seen.

Along the way of the consent negotiations, the Department's wording "selling at below cost" was changed to "selling at unreasonably low prices," mainly because the companies thought that "cost" was too nebulous a word. The wording of the provision now is that GE would be restrained from "selling . . . at unreasonably low prices with the purpose or intent, or where the effect is, or where there is reasonable probability that the effect will be, substantially to injure, suppress or stifle competition or tend to create a monopoly." In a contempt of court proceeding, it would be up to GE to prove that its prices were not "unreasonably low."

On its part, GE made a counterproposal which the Justice Dept flatly rejected. GE had proposed that the wording of the clause be that GE would be restrained from "following any plan, program or course of action of selling . . . at unreasonably low prices with the purpose or intent of substantially suppressing or stifling competition or tending to create a monopoly." This is essentially a restatement of present antitrust laws and would leave the burden of proof on the plaintiff.

PRICES LOWERED ON INDIVIDUAL LUMINAIRE CONTROLS

New prices on individual luminaire-mounted controls have been announced by the Fisher-Pierce division of Sigma Instruments, Inc. The company says the new prices, which were put into effect June 13, average 10% to 20% off prior pricing, and reflect the results of "major cost reduction and production improvement programs."

We'll show you proof of savings!

Conductor side-sway is an important factor in the design of high-voltage transmission lines.

On a conventional 230-kv line with free-swinging suspension strings, conductor sway at the structure necessitates an additional 35 feet of width in the right of way, an additional 10 feet of crossarm width, and an additional 10 feet of structure height. These requirements are correspondingly higher at higher voltages.

If conductors are restrained by V-strings, significant savings can be achieved in right of way, structures, and maintenance - - and electrical performance of the line can also be improved.

If you'd like more detailed information, send for O-B publication number 1503-H, "High Voltage Line Economies With V-string Insulators."

OHIO BRASS COMPANY, MANSFIELD, OHIO

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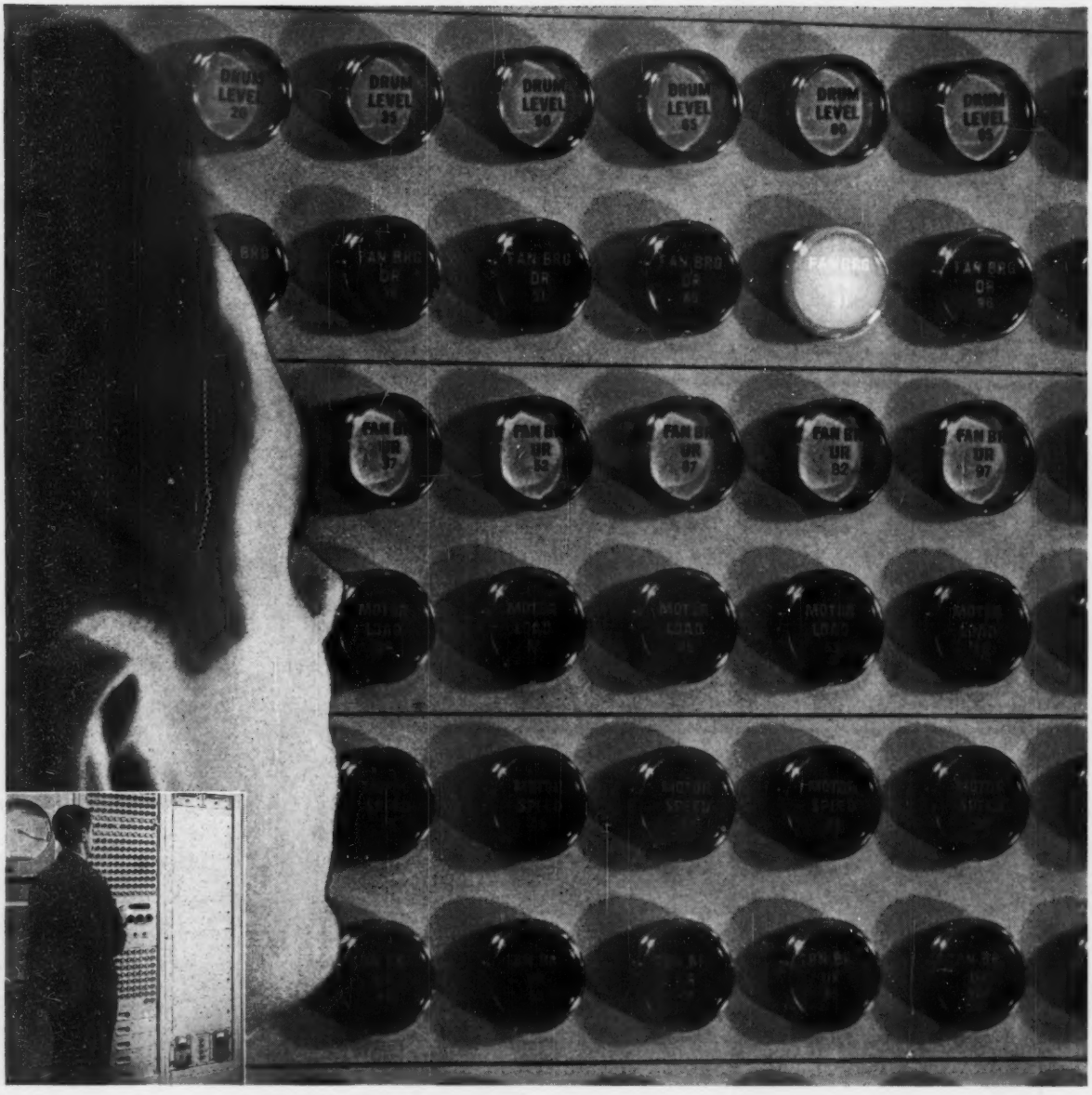

DANGER! Out-of-limits

Just seconds ago a bearing temperature went out-of-limits . . . the Hagan AIM (Alarm Indicating Monitor) has energized the alarm light and sounded a warning horn . . . and, just seconds after the upset, the operator is ready to take corrective action.

Designed to protect valuable plant equipment, the Hagan AIM makes it possible for one man to monitor pressures, temperatures, flows, levels, closures from several critical areas at the same time. AIM can be set for either high or low alarm points, or both.

Combining all alarm functions in one instrument, the AIM will monitor *any* input which can be represented by DC voltages as low as 10 millivolts full scale, with an accuracy of ± 0.1% full scale. Providing maximum information on minimum panel space, the readout and alarm panel for 200 alarm points will fit into a 19″ × 47¼″ panel area.

For more information about the low-cost Hagan AIM, write or phone the address below.

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CHEMICALS & CONTROLS, INC.
HAGAN CENTER, PITTSBURGH 30, PA.

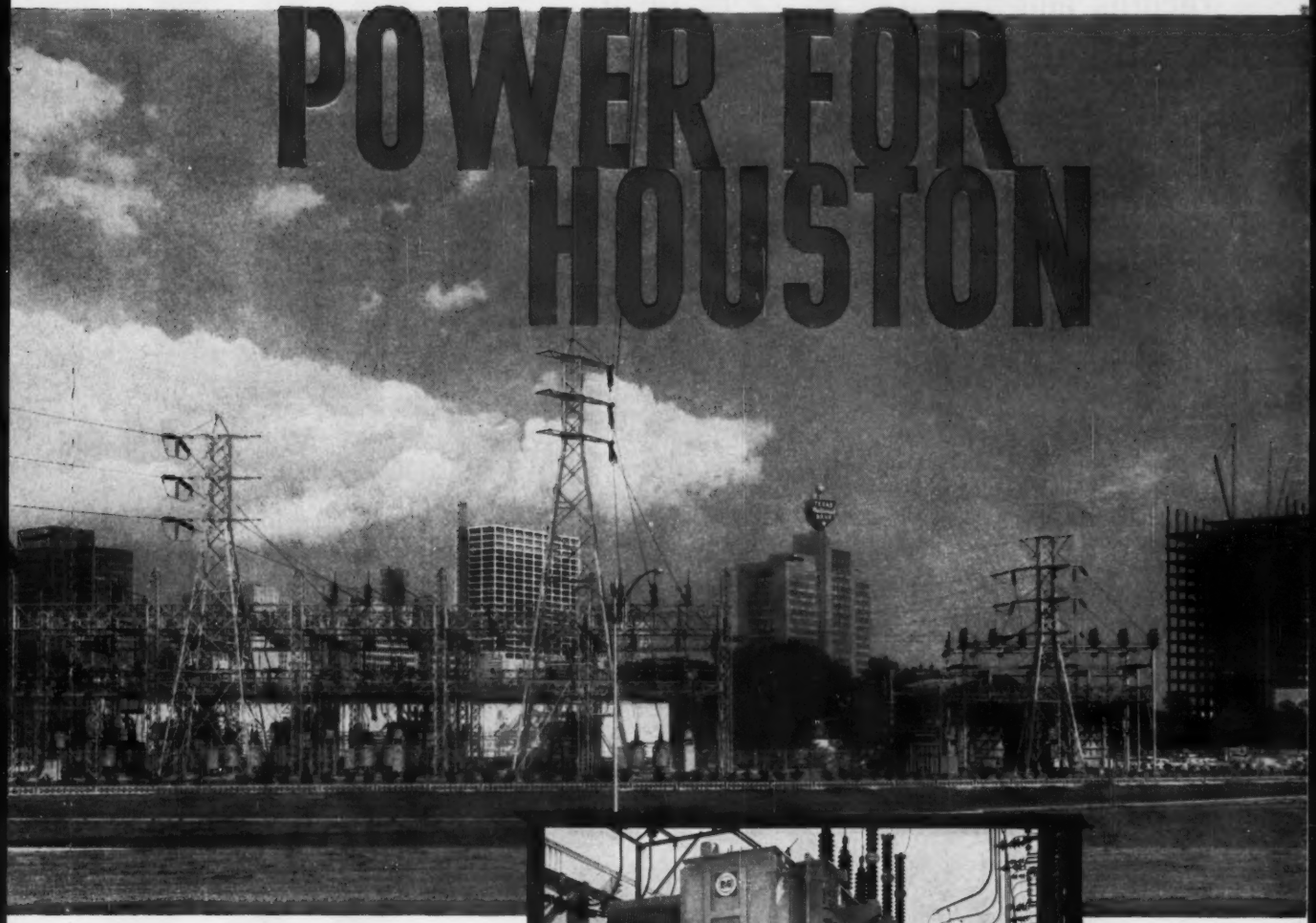
HAGAN DIVISIONS: CALGON CO. • HALL LABORATORIES • BRUNER CORP.

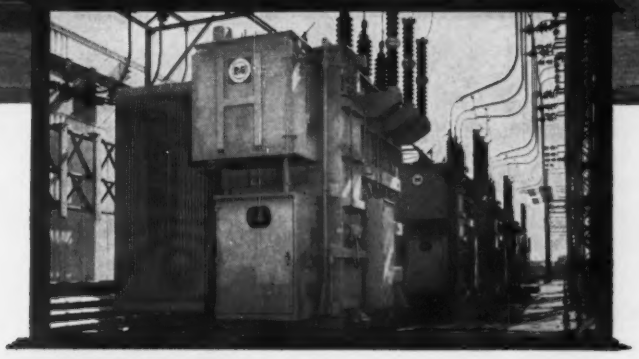
The City of Houston has experienced a steady upsurge in population for years. This thriving and expanding city now ranks 7th in population in the nation.

One of the many reasons for this remarkable growth is the dependable and excellent power service supplied by the Houston Lighting and Power Company.

The view below shows the building activity now in progress in downtown Houston. It also shows a substation that is equipped with six 25,000 KVA LTC Moloney Transformers. Moloney Electric takes great pride in its selection to contribute to the expanding power needs of bustling, growing Houston . . . A model example for urban and industrial expansion everywhere.

POWER FOR HOUSTON





Closeup of Downtown Substation showing six 25,000 KVA, Moloney LTC Transformers.

ME61-9

MOLONEY ELECTRIC

MANUFACTURERS OF TRANSFORMERS FOR

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UTILITIES, INDUSTRY AND ELECTRONIC APPLICATIONS

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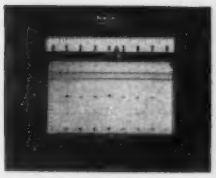
records and indicates all 22 of them!

STATOR TEMPERATURE • ROTOR TEMPERATURE • BOILER TUBE TEMPERATURE • MEGAWATTS
STEAM TEMPERATURE • STEAM FLOW • WATER FLOW • WATER LEVEL



Generating Stations and Dispatch Centers depend on Honeywell *ElectroniK 15* instruments to keep a close check on more than 22 variables . . . from watts, vars, steam flow, stator temperatures . . . to system frequency, tie line interchange, and time deviation.

ElectroniK 15 gives a choice of many measuring circuits, types of records or indication, pen or print wheel speeds . . . lets you incorporate a wide variety of functions or devices. The newly designed modules in the *ElectroniK 15* line have operating and servicing features that represent the very latest developments in the art of reliable instrumentation. Its 11-inch calibrated chart width provides easier, more accurate reading. 112 Honeywell service and sales offices throughout the country are dedicated to the job of keeping *ElectroniK 15* instruments in top operating condition.

With *ElectroniK 15* on the scene, it is no longer necessary to be strapped to a single line of instruments. Many leading utilities throughout the country already know about *ElectroniK 15's* performance and dependability. You can get the facts on the *ElectroniK 15*, too, by contacting your nearby Honeywell field engineer. MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa. In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario.

Honeywell

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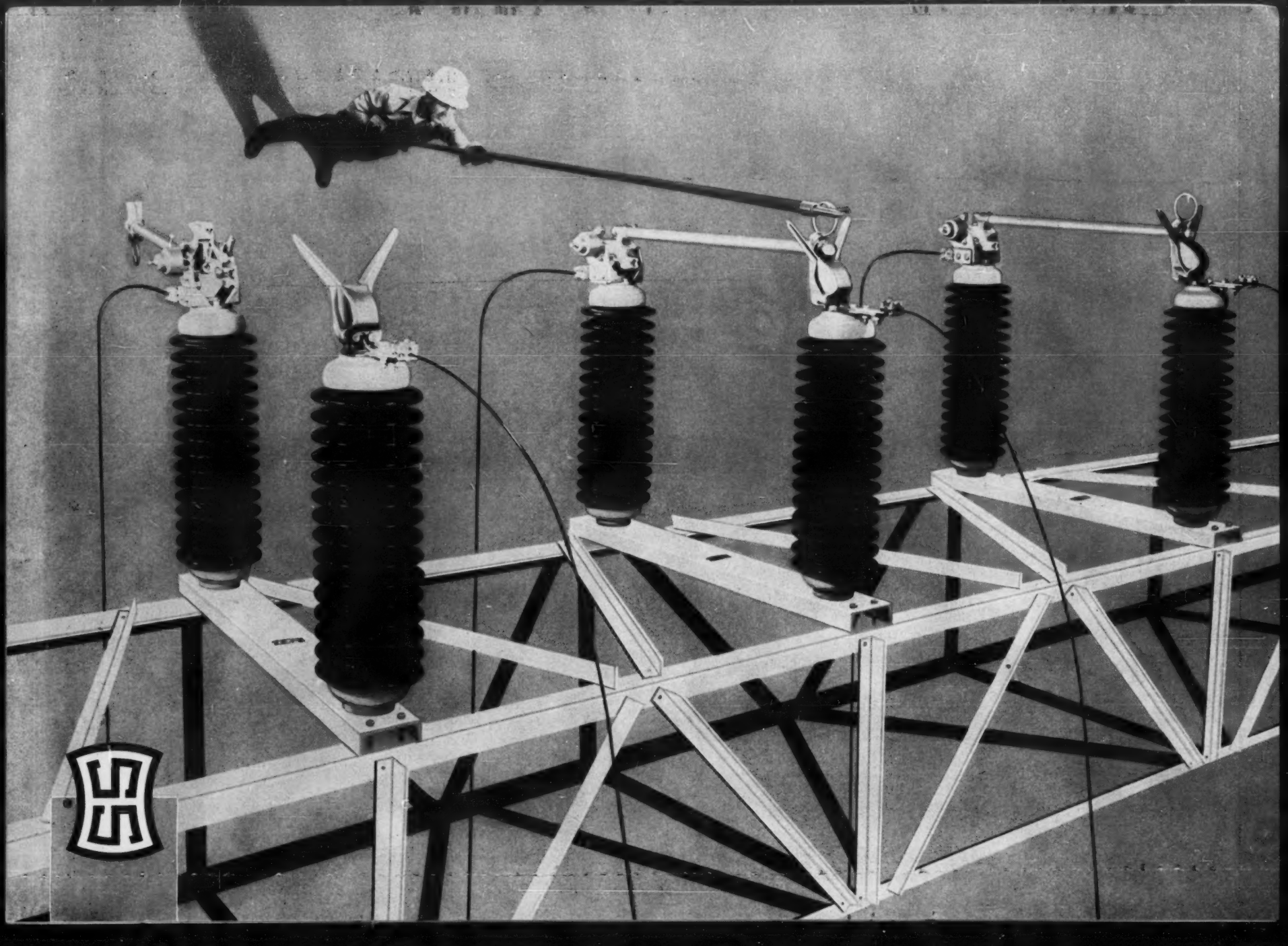
HONEYWELL INTERNATIONAL Sales and Service offices in principal cities of the world. Manufacturing in United States, United Kingdom, Canada, Netherlands, Germany, France, Japan.



DON'T OVERLOOK THE MECHANICAL CHARACTERISTICS WHEN EVALUATING YOUR POWER FUSES

Thermal and electrical characteristics rightfully deserve first consideration in evaluating power fuses, because the fuse must carry rated continuous current and interrupt rated short circuit currents to perform its primary function.

But from an operating and maintenance standpoint, the fuse's mechanical characteristics should not be overlooked. Here are nine of the most important features to consider:

1. **OPERATING RING** Can the fuse holder be easily disengaged from the latch? It is important that the operator have complete control over the fuse holder during the opening procedure. Southern States BPA and HPA fuses have full-circle operating rings to assure complete control.

2. **FUSE HOLDER REMOVAL** Can removal or replacement of the fuse holder be accomplished easily and simply? Special, cumbersome, rigs are objectionable to operating personnel. Southern States fuse holders are handled with a hookstick.

3. **SLEET HOOD** Are the top contacts fully protected from freezing rain, snow, or other foreign matter? Note the extra large hood on Southern States fuses.

4. **POSITIVE HOLDER GUIDE** Will the fuse holder make proper engagement with the top contact, even when closing is made from an oblique angle? Southern States fuses are equipped with generous guide arms on the sleet hood to position the holder properly, regardless of side thrust.

5. **POSITIVE IDENTIFICATION** After operation, does the position of the fuse clearly indicate that an operation has taken place? Southern States fuse holders swing to a fully open position and can be easily spotted from a distance.

6. **SHOCK ABSORPTION** After operation, does the fuse provide a sure means for bringing the fuse holder to a cushioned stop? Damage to the fuse mounting is prevented on Southern States fuses by properly designed snubbers.

7. **LINK PROTECTION** When the fuse holder is slammed closed, is there some means to prevent overstressing the link? To avoid the possibility of rupturing a link, mechanical locks on the BPA and HPA fuses absorb force transmitted through the bottom hinge assembly.

8. **RESTORING SERVICE** Is the fuse easily and economically restored to service after operating? Fuses that require elaborate replacement components to keep them in service are not only costly, but burdensome to both supply and operating personnel. A simple, inexpensive fuse kit is all that's needed to restore service with Southern States power fuses.

9. **SELF-LOCKING HINGE** When the fuse operates, are the fuse holder and fuse mounting locked together? For safety reasons and to avoid possible damage to nearby equipment, Southern States fuses are equipped with self-locking hinges.

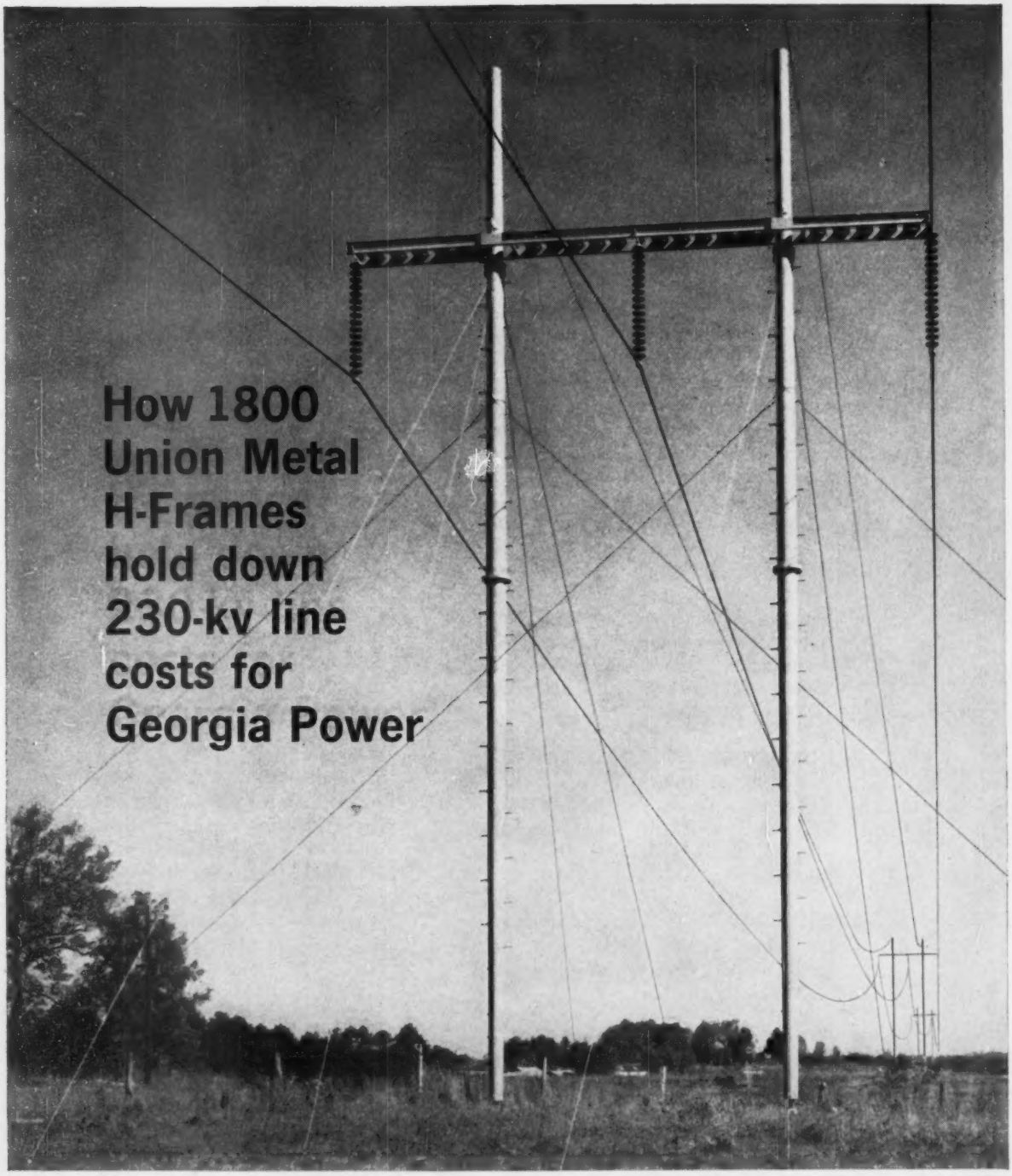
Before you buy your next power fuses make certain they measure up in every respect. Southern States BPA and HPA Power Fuses will.

For complete details, consult your Southern States representative, or write direct to us.

SOUTHERN STATES

HAMPTON, GEORGIA

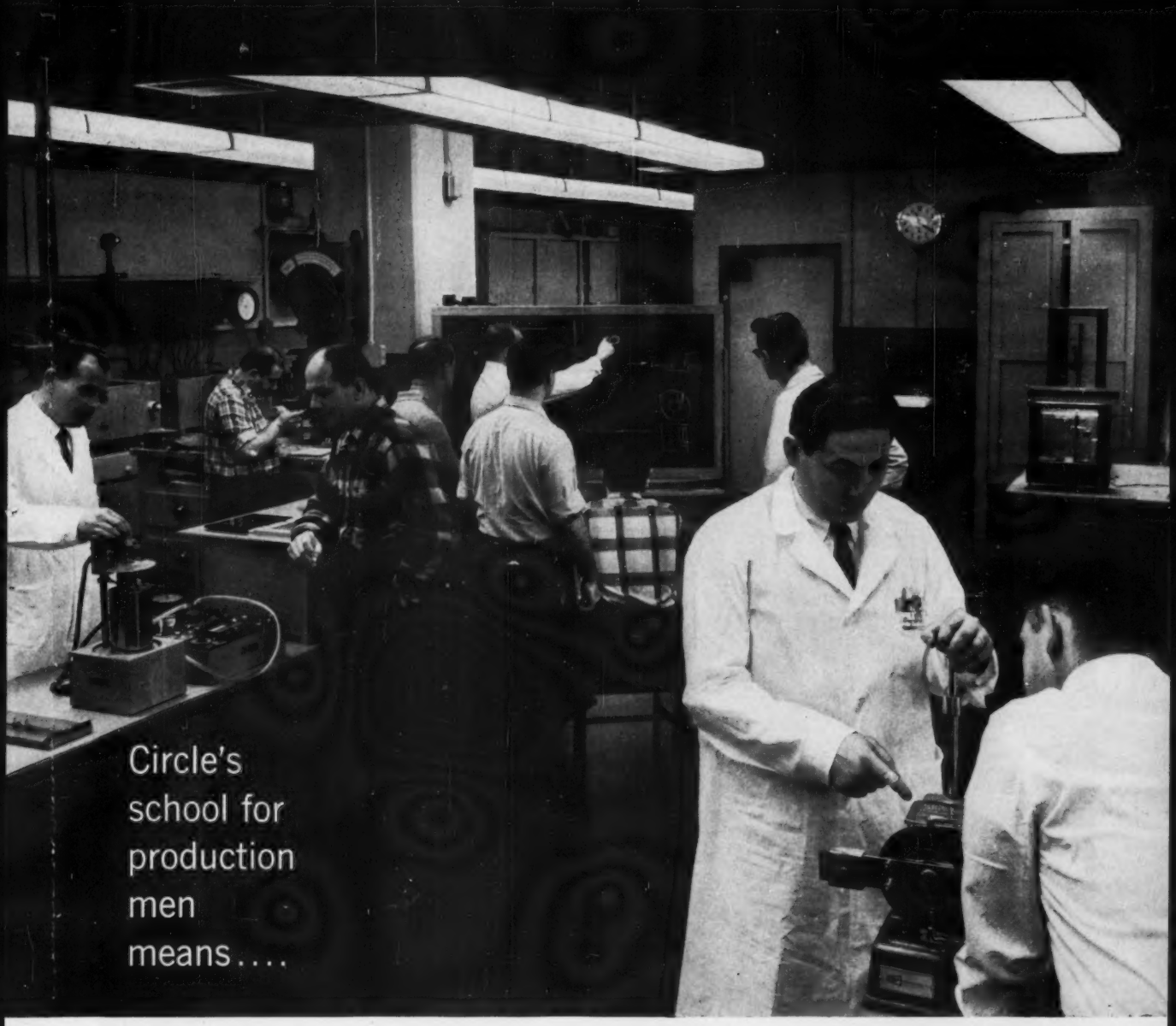
IN CANADA: DOMINION CUTOUT CO., LTD., TORONTO



Reasons why Georgia Power Company installed Union Metal Monotube steel structures on 475 miles of 230-kv line: simplified line engineering; suspension type crossarm advantages; light weight minimizes transportation, handling and erection expense; complete ground assembly increases number of structures set per day; inexpensive precast concrete foundationing; multiple line requirements are met with a few standardized parts; height flexibility reduces number of structures per mile; ample strength to meet wide loading range; major maintenance savings and longer life; pleasing appearance. Information upon request.

The Union Metal Manufacturing Company
Canton 5, Ohio **Brampton, Ontario**

UNION METAL
Monotube Transmission Line Structures



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It isn't enough to build cable quality in the laboratory. There has to be follow-through in production.

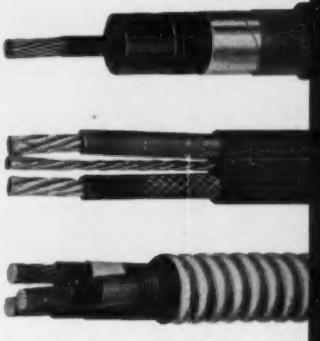
And that calls for production men who not only care enough but *know enough* to consistently turn out top quality products.

That's why Circle production men "go to school." Periodically they attend lectures given by skilled laboratory technicians. They review such subjects as extrusion techniques, proper operating speeds, production line testing procedures, etc.

In-plant training such as this is unusual for wire and cable men. It is one of many reasons, however, why Circle products have achieved a reputation for high quality.

Next time you buy or specify cable, ask for Circle . . . there's no finer cable made.

*Trade Mark



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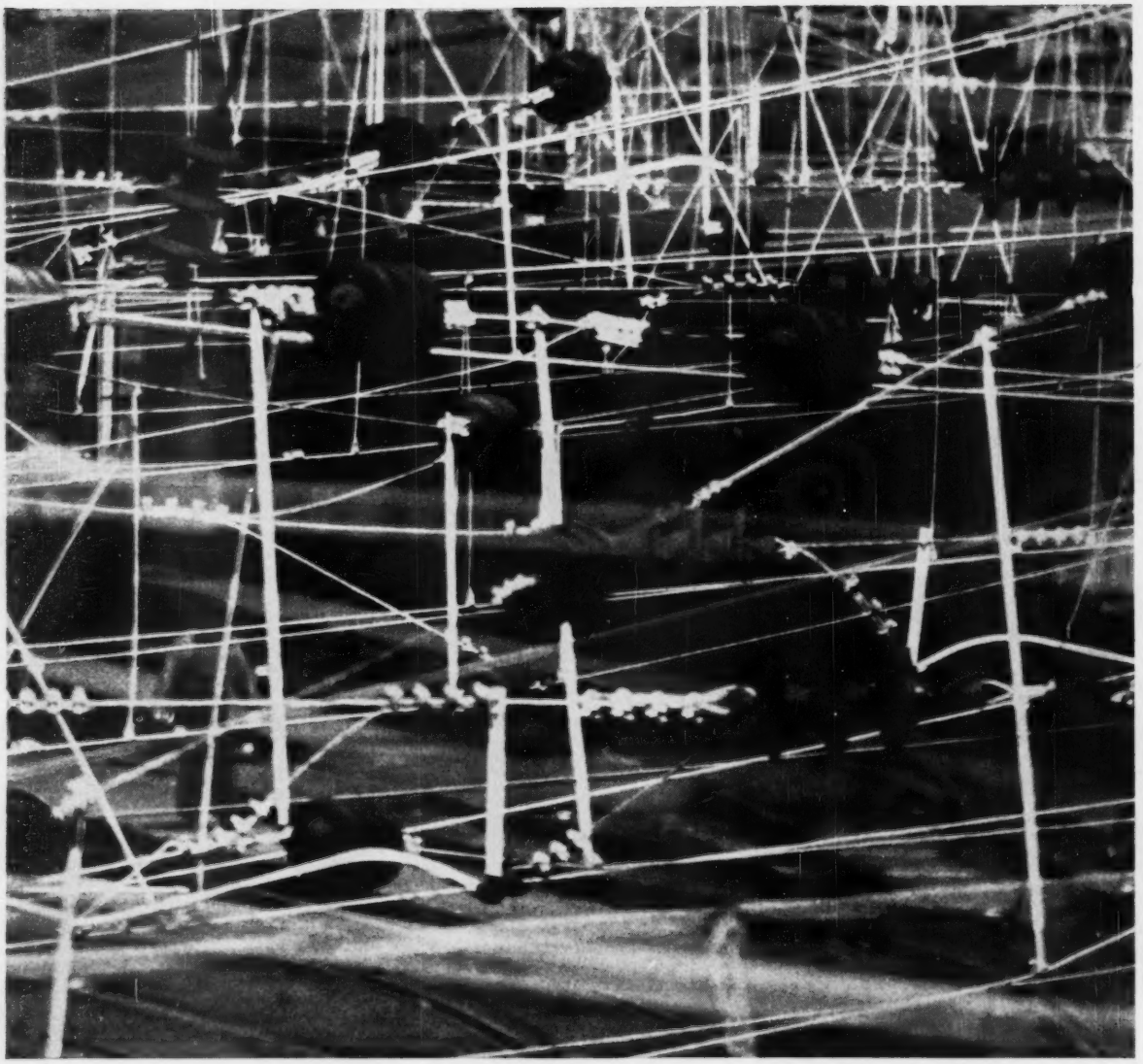

Where will you get new capital for the power-hungry '60s?

The privately owned electric utility industry plans to spend $4.93 billion on new and improved facilities in 1961. And over the next five years it expects to spend almost 10% more on expansion than it has in the past five.

As a vital, creative link between the electric utility industry and money sources, Kidder, Peabody has long experience and leadership in raising debt and equity funds through private placements and underwritings.

Last year, we managed or co-managed the underwriting, sale and distribution to the public and to institutions of 32 new utility issues amounting to more than $214,000,000.

Our 27 offices coast-to-coast have the extensive contacts and facilities needed for prompt, economical distribution of new issues. Our experience and long-established connections with private and institutional investors bring us, every year, large quantities of private placement business. Call or write us for detailed information on how we could help your company meet its requirements for additional capital. Offices in New York, Boston, Philadelphia, Chicago, Los Angeles, San Francisco. Members New York, American, Boston, Philadelphia-Baltimore, Midwest and Pacific Coast Stock Exchanges.

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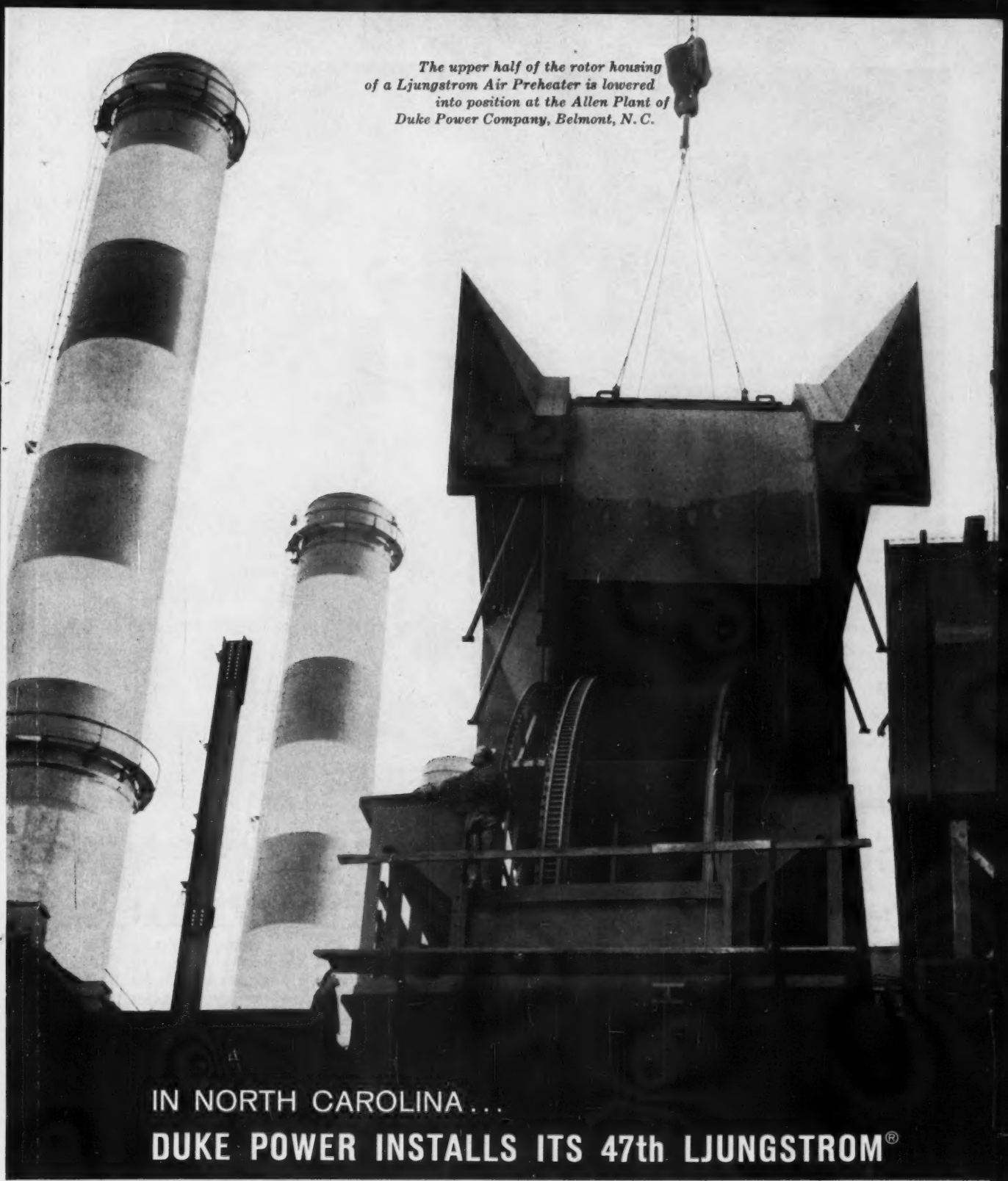

The upper half of the rotor housing of a Ljungstrom Air Preheater is lowered into position at the Allen Plant of Duke Power Company, Belmont, N. C.

IN NORTH CAROLINA...

DUKE POWER INSTALLS ITS 47th LJUNGSTROM®

Duke Power engineers expect 10% annual fuel cost savings with Ljungstrom Air Preheaters at Belmont. Two 512,000-lb Ljungstroms on the #5 boiler of the Allen Plant will preheat incoming air from 80°F to 575°F. Continuous rotary regeneration will recover approximately 390°F waste heat. Every 40° thus recovered cuts fuel requirements 1%.

Our engineers will be glad to recommend how Air Preheater equipment can improve your operating results on new or existing fuel fired units.

THE AIR PREHEATER CORPORATION

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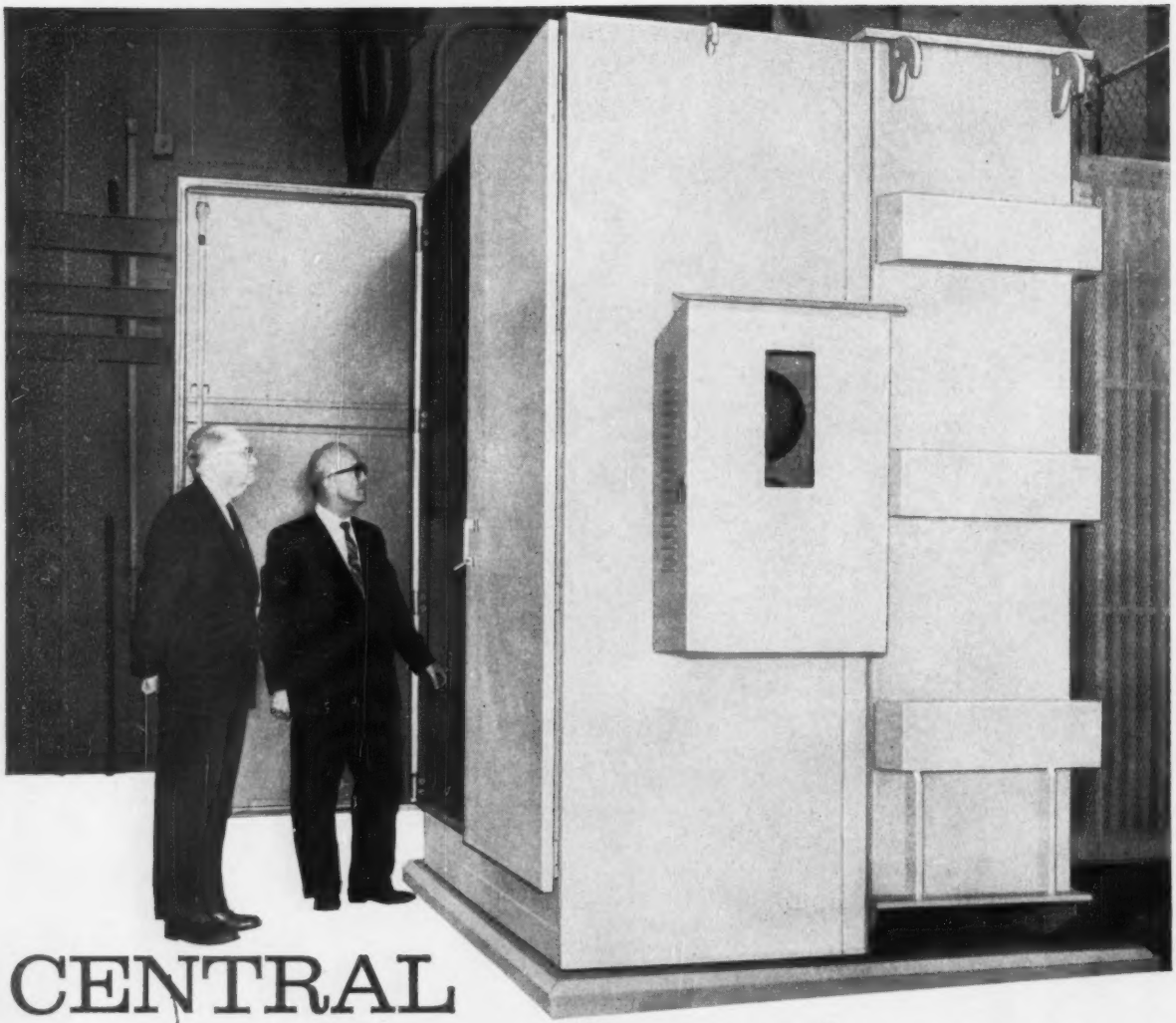

O. B. Ashmore, Senior Engineer, and Lowell Baker, Department Head, Operating Division, for Dallas Power & Light Company, inspect newly installed Pad Mounted Central power transformer.

CENTRAL 1500 KVA Pad Mounted Transformer

NOW IN SERVICE ON DALLAS POWER & LIGHT COMPANY'S SYSTEM

This Pad Mounted power transformer, with its neat appearance, compact size, and tamper proof features, solved a space problem for Dallas Power & Light Company. The Central unit shown above is a 1500 kva, 3-phase power transformer rated 13200 delta primary to 240 delta secondary. It is complete with a free standing outdoor enclosure, with two hinged doors enclosing bushings, lightning arresters, high voltage fuses, pot-heads, gauges, valves and current transformers.

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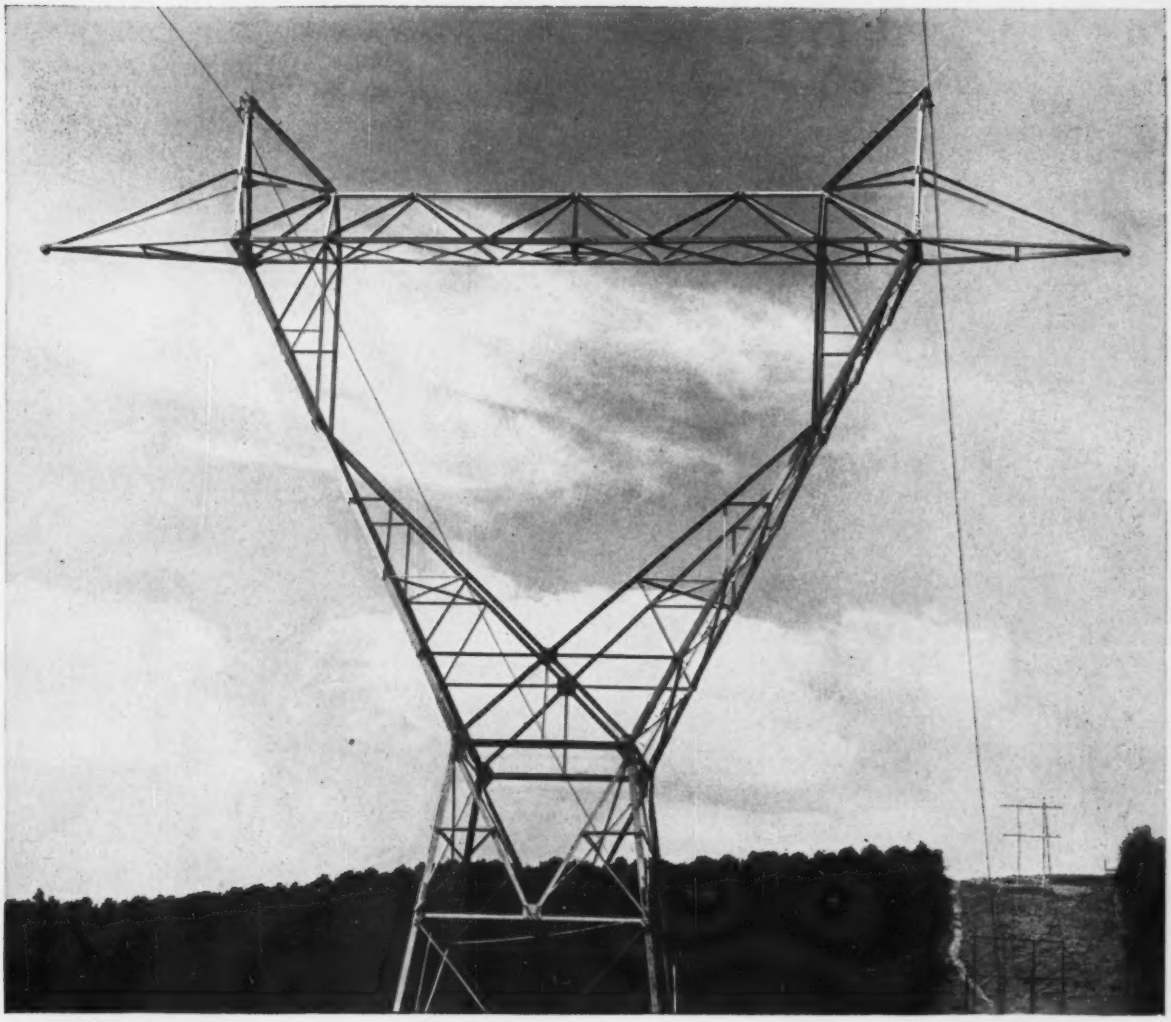
NEMA



Nation's first 460-KV system is protected by Bethlehem overhead ground wire

The nation's first operating 460-KV power transmission line was recently energized by Pennsylvania Electric Company in mountainous terrain between Claysburg and Saxton, Pa. Since operating conditions are abnormally severe, an extensive testing program will be carried out, including studies of lightning strokes.

Protection against lightning is of major importance in extra high-voltage lines. For this reason, PENELEC chose Bethlehem's bethanized "C" coated, ½-in. diameter, extra high-strength strand for 6½ miles of the 13-mile line. Bethanized strand, with its smooth coating of pure, electrolytic zinc is ideal for static application. It acts as a shield to the conductors by intercepting lightning strokes and grounding them.

Today's long spans make overhead ground wires susceptible to fatigue caused by vibration. Steel, because of its high endurance limit, is best able to withstand these fatigue stresses. Bethanized wire has comparable endurance limits to uncoated steel wires, and fatigue tests indicate its superiority over other types of coated wire for this type of service.

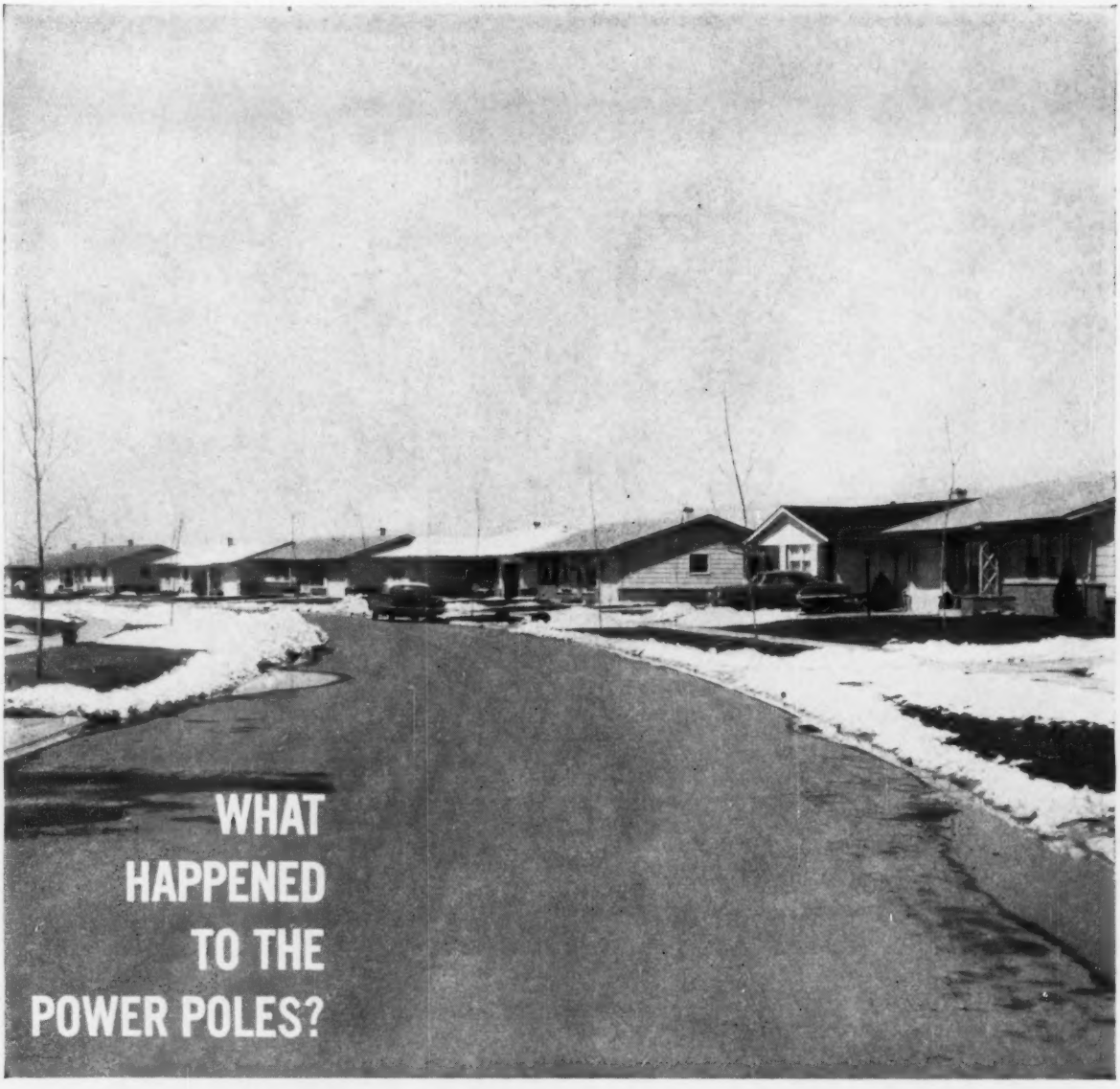
For full information on the wide range of sizes and strengths of bethanized strand, get in touch with the nearest Bethlehem sales office.

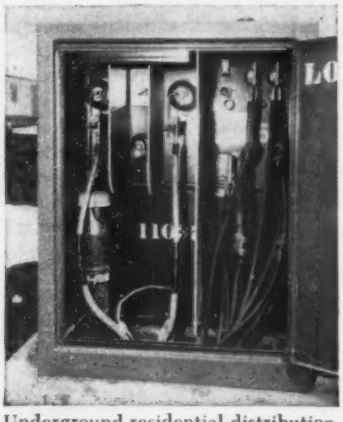
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation
Distributor: Joslyn Mfg. & Supply Co.

Steel *for Strength ... Economy ... Versatility*

BETHLEHEM STEEL

BETHLEHEM STEEL





Underground residential distribution cable is terminated in this backyard transformer compartment. The cable, insulated with BAKELITE polyethylene, was made by Rome Cable Division of Alcoa, Rome, N. Y.

In Elk Grove Village, a suburb of Chicago, the developer worked out an economical arrangement with Commonwealth Edison Company to eliminate all of the power poles in this subdivision. This was accomplished by direct burial of the power distribution cable.

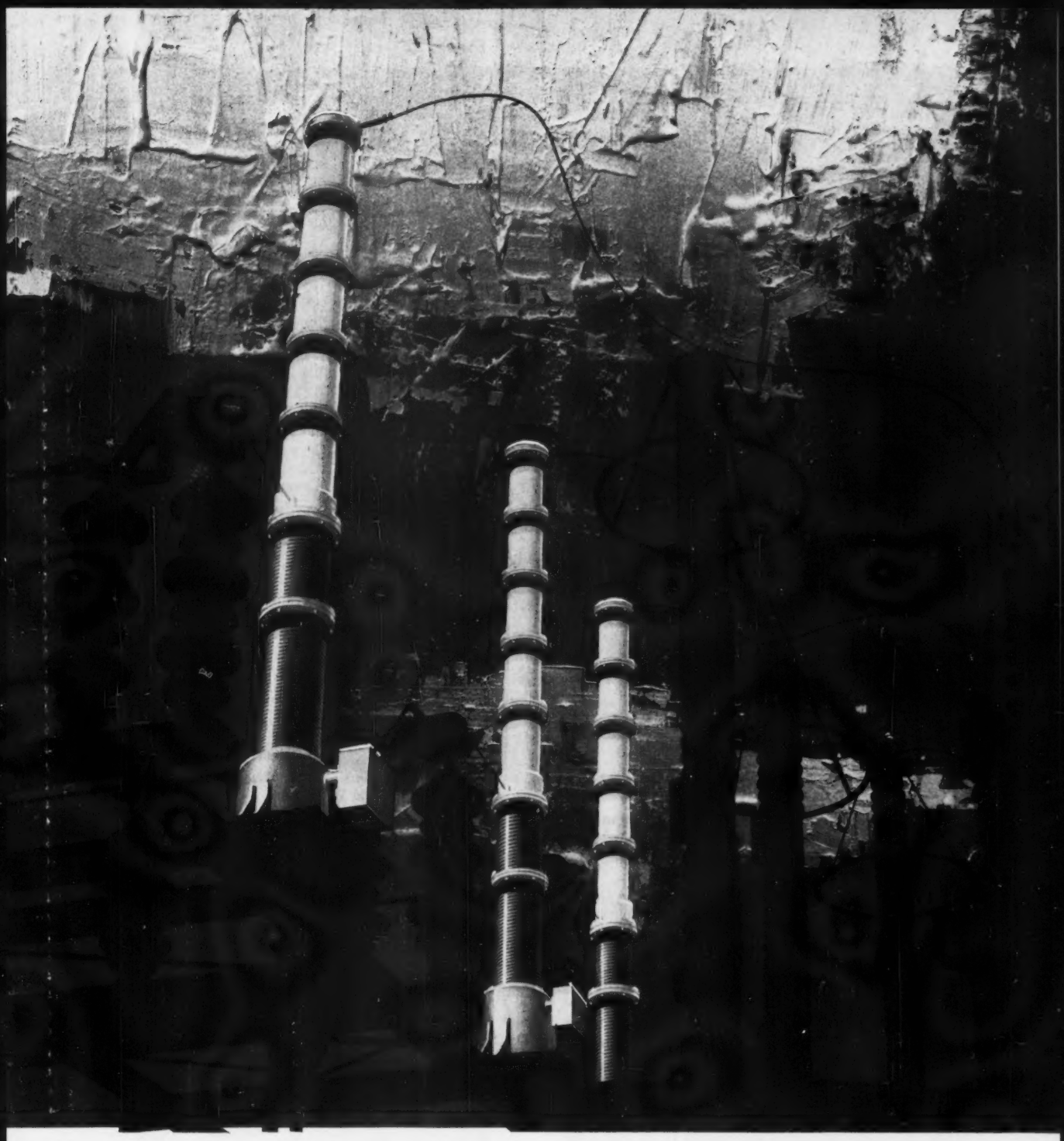
15-Kv cable, insulated with BAKELITE polyethylene, was used on the 7200/12470 system. It was buried directly in the ground at a depth of 36" . . . to assure trouble-free service and improve appearance.

BAKELITE polyethylene insulation has proved to be a tough and dependable performer. It's highly resistant to moisture and cracking . . . an excellent low-loss dielectric above ground, or below it. Lightweight, rugged polyethylene insulated-jacketed cable can stand up to rough handling during aerial or underground installation.

Want more information about BAKELITE insulation and jacketing for more reliable electric service? Write Dept. KD-43F, Union Carbide Plastics Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. *In Canada:* Union Carbide Canada Limited, Toronto 12.

UNION CARBIDE

BAKELITE and UNION CARBIDE are registered trade marks of Union Carbide Corporation.



VACUUM FAULT INTERRUPTERS

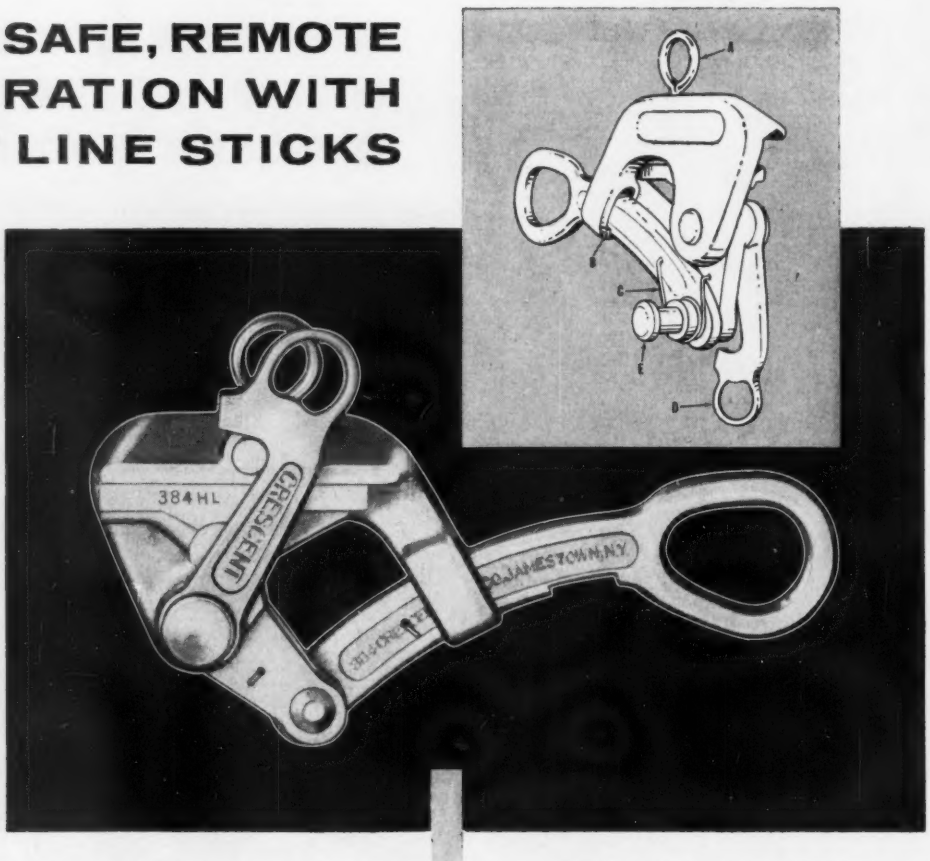
are the circuit breakers of the future—light-weight, maintenance-free and space saving. These Vac-Rupter* Interrupters can be adjacent to either end of a disconnect switch on the same steel. 1½ cycle maximum interrupting time. Shatter-proof, oil-less, non-inflammable, arcless, explosion-proof. Modular design for easy upgrading. Other exclusive features are described in detail in Bulletin 50-201. *Patent No. 2,915,611.*

HI-VOLTAGE EQUIPMENT COMPANY

Division of Joslyn Mfg. and Supply Co., Chicago, Ill. • 4000 East 116th Street, Cleveland 5, Ohio

CRESCENT HOT LINE GRIPS

FOR SAFE, REMOTE OPERATION WITH HOT LINE STICKS



▶ These grips are an adaptation of the standard Crescent Grip which has earned a reputation with line crews everywhere for being jamproof, slip-proof and instantly releasing.

Operation is simple for linemen familiar with the use of hot line sticks. Grip is held open by engaging notch "B" in bottom of frame loop. Grip is then placed on wire by means of eye "A". Latch "D" is swung into place with hot line stick. Jaws are closed by action of spring "C" when engagement of notch "B" is tripped by upward movement of the pulling eye arm. Grip is released by placing hot line hook on rivet stud "E" and pulling until notch "B" engages frame loop.

Made in three sizes; each grip tested to its safe load capacity. Cadmium plated.

SPECIFICATIONS

SERRATED JAWS	MAXIMUM CAPACITY	MINIMUM CAPACITY
No. 383 HL	5/16 (.3125)" 8 mm	5/32 (.156)" 4 mm
No. 384 HL	1/2 (.500)" 12.2 mm	1/4 (.250)" 6.5 mm
No. 385 HL	3/4 (.750)" 19 mm	3/8 (.375)" 9.5 mm

No. 383-2 HL, 384-2 HL and 385-2 HL same, except with smooth jaws for bare aluminum wire.

Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK

CRAWFORD STATION COMMONWEALTH EDISON COMPANY *482,500 kw—4 Units*

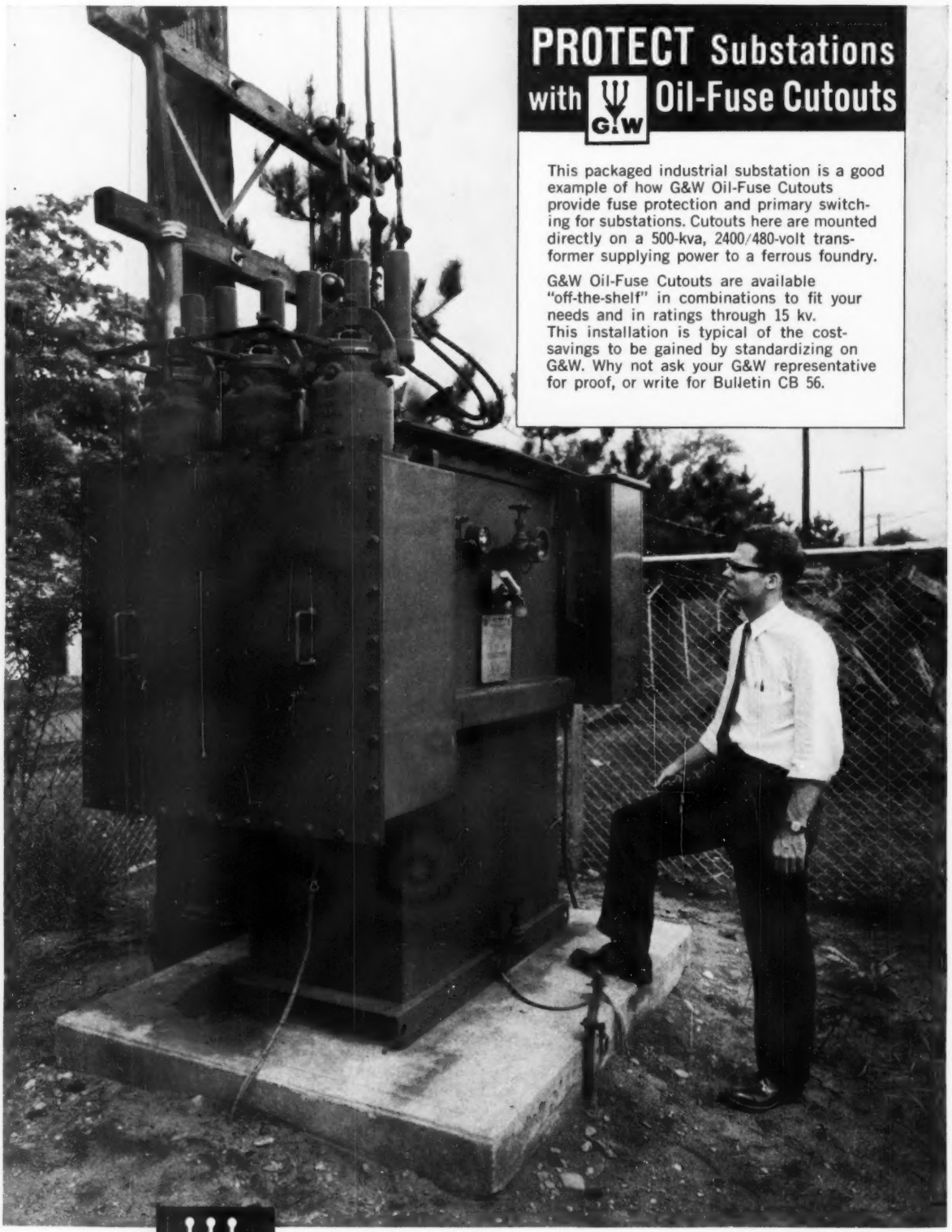
Power in Illinois. . .

Chicagoland's Commonwealth Edison Company is one of the nation's foremost electric utilities. The company's Crawford Station was the largest steam electric plant in existence when it was completed in 1928. Its turbine-generators were the largest machines manufactured up to that time. Now, major design developments will permit doubling the capacity of the station within the framework of the existing plant. The first step in the up-dating has already been taken and the second step is in process. When this is completed this historic plant will again rank among America's major central stations. Along with other major installations, Crawford's rebuilding will provide the Commonwealth Edison system with a total net capacity of over 6.4 million kw by mid 1963.

FULL COLOR BROCHURE outlining the scope of Sargent & Lundy services will be sent on request.

SARGENT & LUNDY
ENGINEERS

140 SOUTH DEARBORN STREET, CHICAGO 3, ILLINOIS



PROTECT Substations with G&W Oil-Fuse Cutouts

This packaged industrial substation is a good example of how G&W Oil-Fuse Cutouts provide fuse protection and primary switching for substations. Cutouts here are mounted directly on a 500-kva, 2400/480-volt transformer supplying power to a ferrous foundry.

G&W Oil-Fuse Cutouts are available "off-the-shelf" in combinations to fit your needs and in ratings through 15 kv. This installation is typical of the cost-savings to be gained by standardizing on G&W. Why not ask your G&W representative for proof, or write for Bulletin CB 56.

G & W ELECTRIC SPECIALTY COMPANY

3500 WEST 127th STREET • BLUE ISLAND, ILLINOIS

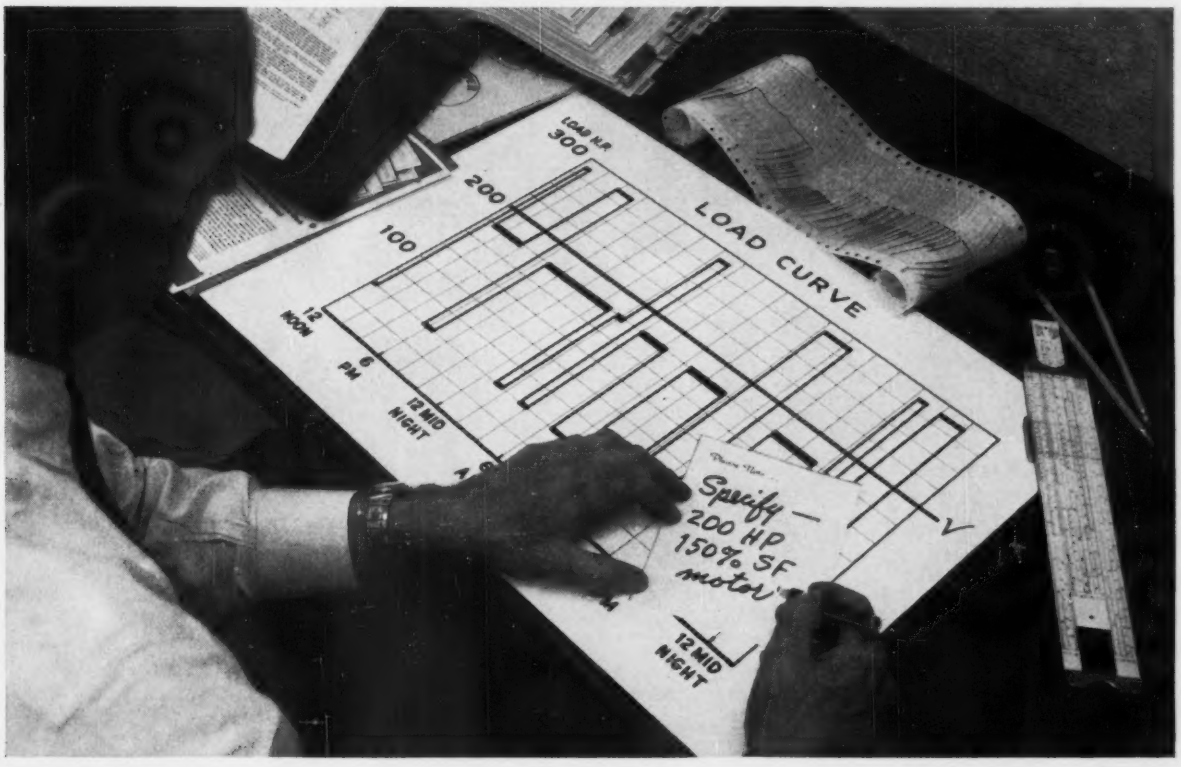
CANADIAN MFR. • POWERLITE DEVICES LTD. • TORONTO, MONTREAL & VANCOUVER

superior quality standards — inspired specialized design

C 61-1

SILICONE NEWS from Dow Corning

Over-motoring Out-moded



Specify horsepower for nominal loads, Service Factor to handle the peaks!

Specifying motors with nameplate horsepower rated for peak load conditions is rapidly being out-moded as too expensive.

Today, it's far more economical . . . and just as reliable . . . to specify silicone insulated extra service factor motors with horsepower ratings based on nominal load conditions.

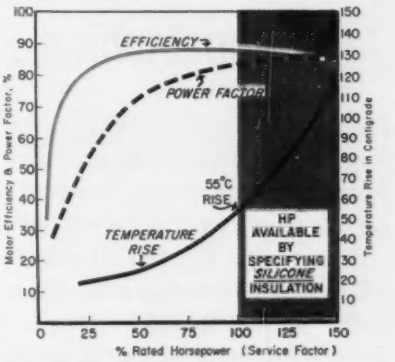
Additional horsepower output — up to 50% above nameplate rating — is available for peak loads.

Where does this additional capability come from? It's the hidden horsepower in the higher service factor rating! It's the result of the exceptional thermal stability of silicone insulating materials.

Life and reliability of these motors is unaffected by peak loads . . . silicones are immune to the heat of even constant loads within the service factor rating. So why specify a 300-hp motor when a 200-hp motor with a 150% service factor is what's needed? Silicone insulated extra service factor motors give you these extras, too:

Top efficiency is obtained under normal load since the motor is operating at its designed horsepower rating most of the time.

Additional savings in several ways: additional nameplate horsepower is usually more expensive than the extra service factor silicone insulation provides; additional horsepower requires extra floor space and heavier mountings; over-motoring power factor problems are eliminated or minimized.



Free brochure—"Specify Silicone Insulated Equipment and Save." Write Dept. 3918

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

Typical of the runners for the Francis-type turbines being built by B-L-H for Appalachian Power's Smith Mountain Dam

Appalachian Power turns to B-L-H for turbines

Indicative of B-L-H's work with private utilities is the Appalachian Power Company's new project on the Roanoke River in Virginia. Two power-generating dams are being constructed. Both will utilize B-L-H turbines.

For the upper dam, located at Smith Mountain Gap, B-L-H will furnish two giant Francis-type turbines. Each is rated at 204,000 hp when operated at 100 rpm under 179-ft. head. So massive are the runners—in excess of 20 ft. in diameter and weighing over 140 tons—that they will have to be shipped to the dam in halves.

For the lower dam, near Leesville, B-L-H is building two fixed-blade propeller-type turbines. Each is rated at 32,300 hp when operated at 138.5 rpm under 65-ft. head.

In addition to all four basic types of turbines, B-L-H manufactures governors, surge suppressors, valves, special pumps, and other accessory equipment. For more information and a free copy of our illustrated Turbine Bulletin 1002, write B-L-H Corporation, Philadelphia 42, Pa., or Pelton Division (B-L-H), 2929 Nineteenth St., San Francisco 10, Calif.

BALDWIN · LIMA · HAMILTON

Industrial Equipment Division · Philadelphia 42, Pa.

and Need it Fast, **Call Southwire!**

Everything about Southwire Galvanized Steel Strand spells quality—including the service. The product meets or exceeds applicable ASTM specifications. Southwire service sets the standards for the industry.

STRAND SIZE (Also 5/8" 1/2" 9/32")	7/16"	3/8"	5/16"	1/4"	3/16"
WEIGHT PER 1000'	399 lb.	273 lb.	205 lb.	121 lb.	72.9 lb.
MINIMUM BREAKING STRENGTH IN POUNDS					
ASTM A-122-54T					
Galvanized (Single Galv.) Common	5700	4250	3200	1900	1150
Class A (Double Galv.) Common	5700	4250	3200	1900	1150
Class A (Double Galv.) Siemens-Martin	9350	6950	5350	3150	1900
Class A (Double Galv.) High Strength	14500	10800	8000	4750	2850
Class A (Double Galv.) Extra High-Strength	20800	15400	11200	6650	3990
Class A Utilities Grade, A.T.&T. and Western Union Spec.—7-wires	18000	11500	6000*		2400**
ASTM A-363-55T (No welds)					
Weldless High-Strength	14500	10800	8000		
Weldless Extra High Strength	20800	15400	11200		

*Weight per 1000' —225 lbs. **Weight per 1000'—80.3 lbs.

Stock items are shipped fast. Special orders are processed rapidly, thanks to flexible manufacturing schedules.

High quality Southwire Galvanized Steel Strand is preformed to eliminate flared ends when sheared. It comes to you in 250', *500' and 1,000' coils, and in 2,500', *5,000' and 5,280' reels. Special packaging to meet your requirements is available.

Specify Southwire Galvanized Steel Strand for ground, messenger and guying applications and be sure of quality—in both product and service!

Stock items

Southwire Company

SOUTHWIRE serves the world

Carrollton, Georgia · TErrace 2-6311

PUBLIC SERVICE COMPANY OF INDIANA, INC. headquarters at Plainfield

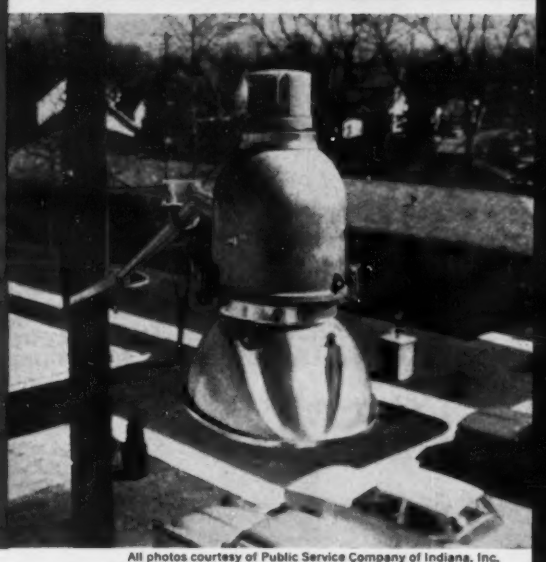
THOUSANDS OF FISHER-PIERCE CONTROLS HAVE FOUND A HOME IN INDIANA

Model 6600A photoelectric controls are a familiar sight in the area served by Public Service Company of Indiana, Inc., as these photos show. "Just plain economics" is the way one Company official explains the trend to multiple individual control. Installation costs are lower. Maintenance is less of a problem, too — reliable Fisher-Pierce controls more than pay their way by eliminating frequent repair calls.

Multiple individual control fits into the PSCI voltage conversion program by eliminating the need for expensive series circuits, taller poles and additional arms for street lighting. The method pays dividends in customer satisfaction, too. Residents are assured of dependable street light operation, and neighborhood appearance is improved by uncluttered poles. Storm outages cause less concern since entire streets are not always plunged into darkness at a stroke. Outages are generally shorter in duration — street lights, supplied from secondary lines, can be returned to service as soon as residential service is restored.

THE HOOSIER STATE'S largest electric utility needs this helicopter to inspect its far-flung power lines.

STREET LIGHTING in Plainfield housing development is all Fisher-Pierce controlled.



All photos courtesy of Public Service Company of Indiana, Inc.

NEWEST PUBLIC SERVICE COMPANY generating facility is the Robert A. Gallagher Station, recently completed. System generating capability has grown to 1.6 million kilowatts, more than a four-fold increase since 1948.

For complete design information and operating specifications on Series 6600A controls, write

FP

FISHER PIERCE
DIVISION

SIGMA INSTRUMENTS, INC.
82 PEARL ST., SO. BRAINTREE 85, MASS.

NOW STANDARD OFFERS THREE LOW-

Which One's Best For Your System?

Standard introduced the industry's first low-loss distribution transformers in 1958 because it recognized certain key differences in systems, rapidly changing industry costs, and new trends in loading practices. It was obvious NO ONE TRANSFORMER could meet the needs of ALL SYSTEMS.

When you boil it all down, the best way to evaluate distribution transformers is to study the operating characteristics of YOUR OWN SYSTEM and emphasize the difference between investment and energy components. Standard can help you capitalize on your system's characteristics rather than be penalized by them. May we DISCUSS THIS CONTROVERSIAL SUBJECT with you and show you how Standard Transformers can help lower your operating costs?

COMPARISON OF STANDARD Distribution Transformers

TYPE SWA—The "Cream of the Crop" for systems where:

- Transformers carry very heavy overloads for 6 hours.
- Load Factor is 30 - 50 percent or higher.
- Distribution Transformer Peak is coincident with System Peak.
- System Investment Costs are medium to high.
- Fuel Costs are medium to high.
- Excellent for house heating loads — good regulation at times of heavy loads.
- Average Transformer Price Index = 107.

KVA	Watts Loss		% Impedance 75°C.	% Regulation	
	No Load	Total 75°C.		1.0 P.F.	0.8 P.F.
10	67	211	1.7	1.5	1.7
15	90	277	1.7	1.3	1.7
25	130	417	1.7	1.2	1.7
37½	172	572	2.0	1.1	1.8
50	210	715	1.9	1.0	1.7
100	400	1290	1.5	.90	1.4

TYPE WA—This unit has slightly better performance than the industry standard and can be economically applied on systems where:

- Transformers are not overloaded.
- Load Factor is 20 - 30 percent.
- Distribution Transformer Peak is coincident with System Peak.
- System Investment and Fuel Costs are relatively low.
- Average Transformer Price Index = 100.

KVA	Watts Loss		% Impedance 75°C.	% Regulation	
	No Load	Total 75°C.		1.0 P.F.	0.8 P.F.
10	67	248	2.3	1.9	2.3
15	90	327	2.0	1.6	2.0
25	130	498	2.1	1.5	2.1
37½	172	654	2.2	1.3	2.1
50	210	847	2.2	1.3	2.1
100	350	1522	2.2	1.2	2.1

TYPE CWA—This unit is recommended for systems where:

- Transformers carry heavy overloads for 4-hour peak period.
- Load Factor is 30 - 40 per cent.
- Distribution Transformer Peak is **not** coincident with System Peak. This means lower demand charge for Distribution Transformer Loss Energy.
- Fuel Cost is relatively low.
- Average Transformer Price Index = 96.

KVA	Watts Loss		% Impedance 75°C.	% Regulation	
	No Load	Total 75°C.		1.0 P.F.	0.8 P.F.
10	75	229	1.7	1.5	1.7
15	112	330	1.6	1.5	1.6
25	161	479	1.5	1.3	1.5
37½	215	645	1.5	1.2	1.5
50	280	840	1.4	1.1	1.4
100	480	1440	1.3	1.0	1.3

WRITE for Standard's Distribution Transformer Bulletin. With it you'll RECEIVE COMPLETE PERFORMANCE DATA.

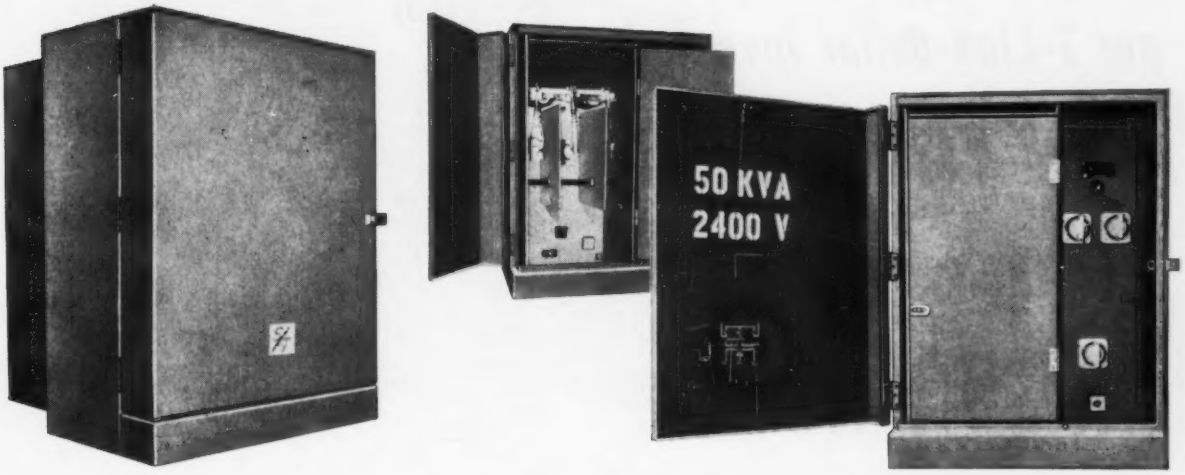
Standard Transformer CO.

WARREN, OHIO, U.S.A.

Phone: EXpress 2-1563

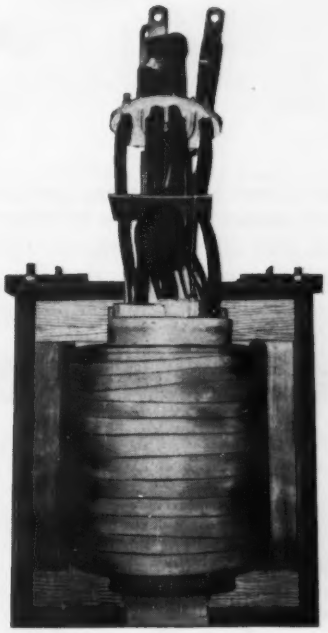
"WHEREVER THERE IS POWER"

LOSS DISTRIBUTION TRANSFORMERS



STANDARD'S FIELD-TESTED, pad-mounted units compartmental design permits changes in single phase transformers without a change of terminations. Standard termination compartments give you complete flexibility from 15 KVA through 50 KVA and 75 KVA through 167 KVA. You change the transformer only . . . just as you do on a pole.

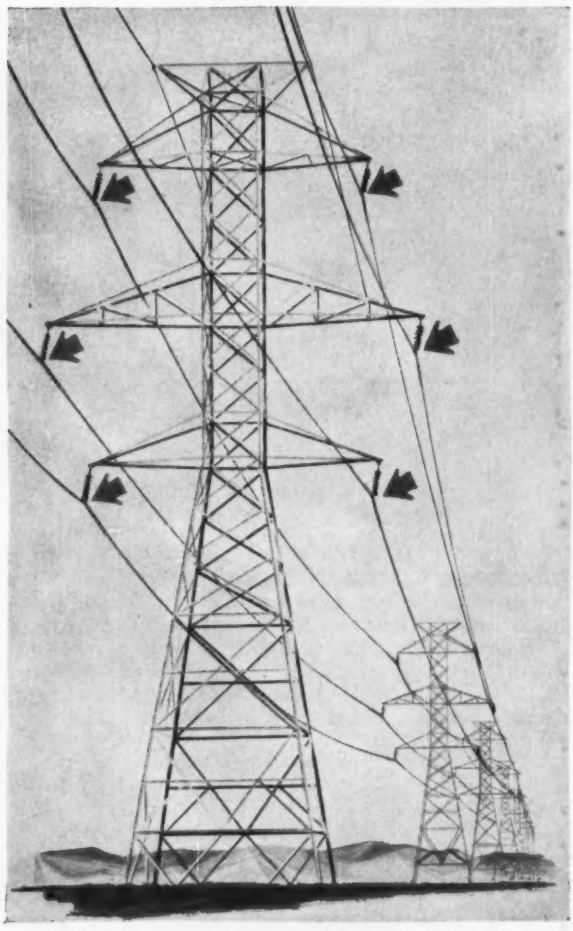
You can work on the secondary side with perfect safety because the high voltage side is protected by an inside door. Outside door is equipped with a hasp and lock. Performance data matches that of Standard's SWA series of pole-type units. You have complete flexibility on protection and switching equipment to meet individual preference.



EXCEPTIONAL PERFORMANCE by these SWA units has placed them on the approved lists of leading utility companies. Extremely low copper losses, low impedance and low temperature rise without excessive voltage drop put these units in a class by themselves. Your Standard representative can show you how they reduce "unaccounted for" losses on your system.

Lifetime protection for less than 1/4 cent per T-Line dollar invested ...with FANNER Superformed* ARMOR RODS

at these vulnerable points



For only a fraction of a penny per transmission-line dollar invested . . . Fanner SUPERFORMED armor rods give lifetime protection to conductors at vulnerable supporting points.

Top-quality products of the world's FIRST MAKER of machine-formed armor rods . . . Superforms are uniformly strong, dimensionally accurate, smooth surfaced, easy to install. Available for all conductor types and sizes. Learn how little so much extra protection costs. Call today.

A FEW FANNER Superforms AND FINEST PLASTIC PRODUCTS

ARMOR RODS . . . Protect long spans at supports

LINEGUARDS . . . Protect short spans at supports

FANNGRIPS . . . For dead-ending strands or conductors

FANNSPLICES . . . For joining or patching strands

Plastic TREEGUARDS . . . Protect conductor surface covering

Plastic KOVER-GUARDS . . . Protect surface-mounted conductors

*A superior forming method in accordance with Patents No. 2,769,478 and 2,588,663—other patents applied for.

THE FANNER MANUFACTURING COMPANY
Brookside Park • Cleveland 9, Ohio

DIVISION OF TEXTRON, INC.

Fanner Superformed Products

A-4545A

Undetected flame failure can cause costly interruptions, do serious damage to expensive equipment and endanger lives. To prevent such loss, Honeywell has developed an ultraviolet flame detector that won't be fooled, because it positively differentiates between flame and hot brick.

This flame detector senses only the flame!

No more hot refractory hold-ins!

For the first time, you can be absolutely sure that fuel delivery will be stopped in the absence of flame. Honeywell's C7012A Ultra-Vision* Flame Detector employs an amplified ultraviolet signal to positively distinguish between an actual flame (ultraviolet rays) and a hot refractory (infrared rays). This revolutionary new device represents a major breakthrough in scientific flame detection.

Not only is the Ultra-Vision Flame Detector compact. It also simplifies flame supervision of both single and multiple burners because, not being sensitive to a hot refractory, it can be aimed at each individual flame in the most convenient way. It is the only control device on the market that offers you this advantage.

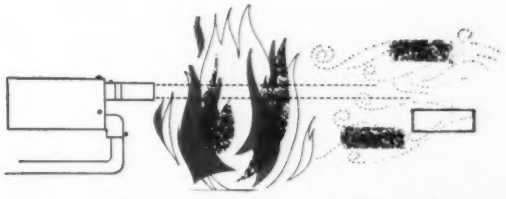
Is it economical? This amazing new flame detector will actually save you money in simplified installation and maintenance. Wiring is less expensive in this system than in a lead sulphide cell. It is easier to install because hot refractory can be ignored. And there is no further need for flame rod replacement.

For complete details, call your nearby Honeywell office. Or write Honeywell, Dept. ET-6-24 Minneapolis 8, Minnesota. In Canada, write Honeywell Controls, Limited, Toronto 17, Ontario.

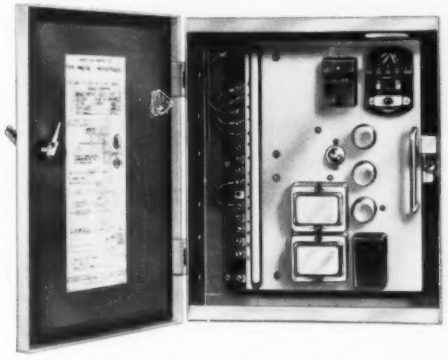
Honeywell

First in Control

SINCE 1885



Honeywell's new Ultra-Vision Flame Detector sights the flame of all fuels, but is not affected by hot brick. It does a more effective job on single burner pilot and main flame installations. And now, for the first time, multiple burner installations can also be monitored safely.



Honeywell's new R4075 Protectoglo* Flame Safeguard Relay features a "maximum-safety" self-checking circuit to continuously supervise constantly burning industrial burners. The mounting cabinet has all-voltage terminals and a quick-disconnect control base that allows this electronic flame safeguard to be completely removed without disconnecting any of the wiring.

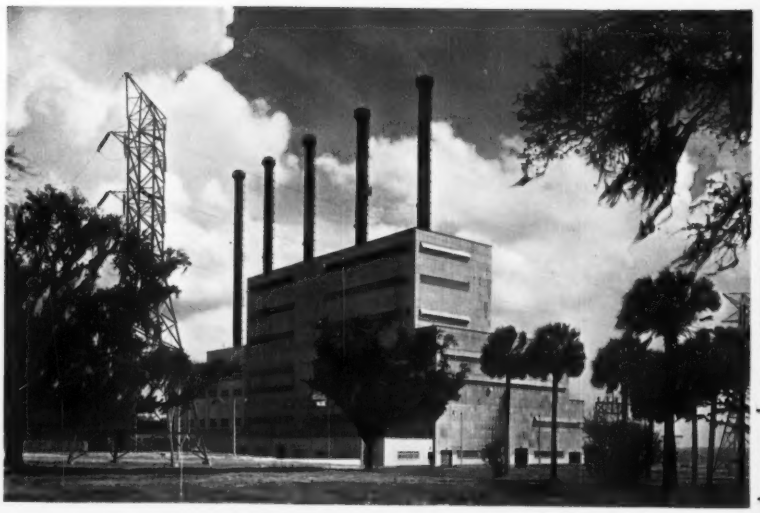
Trademark

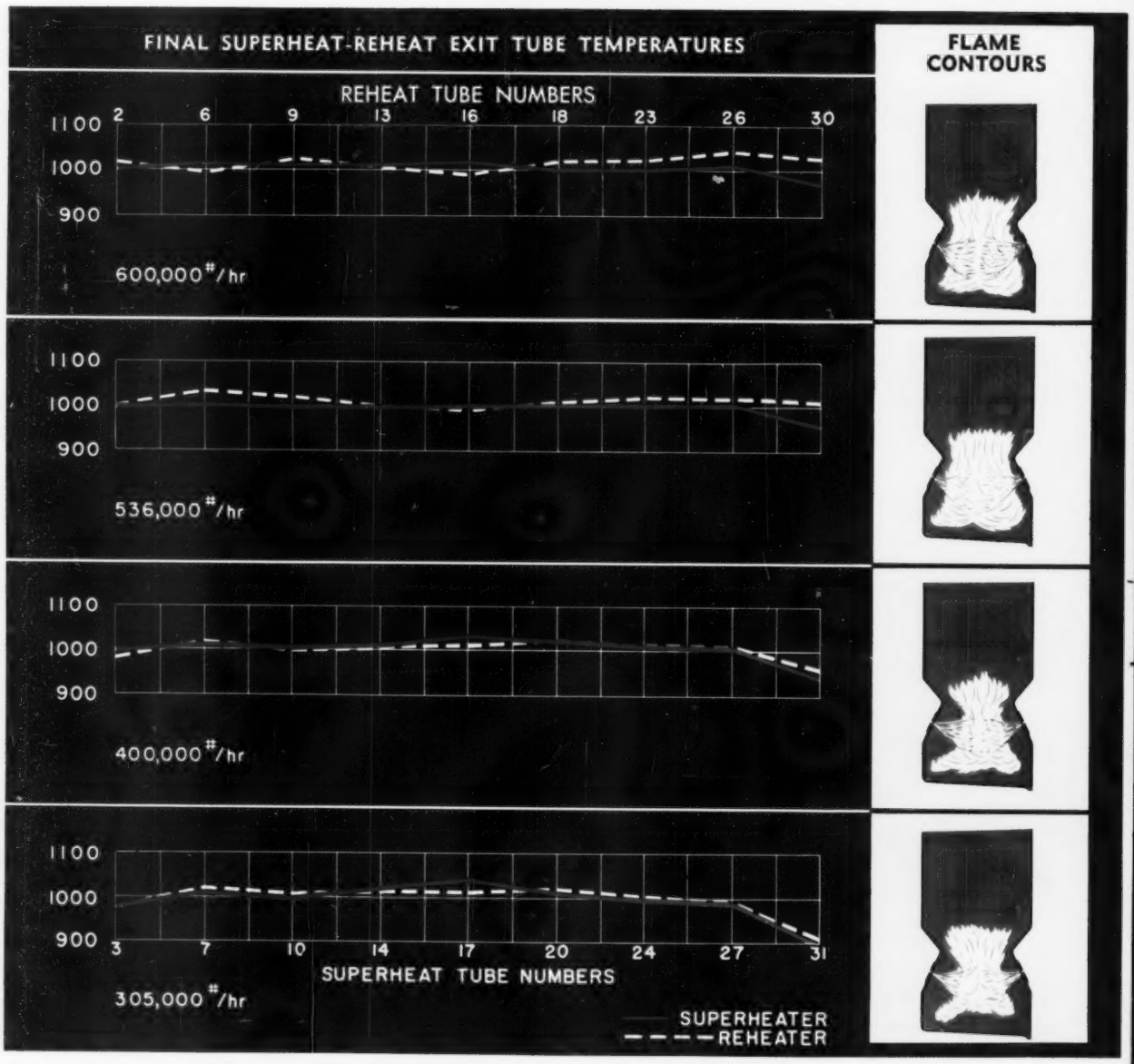
FLORIDA POWER CORPORATION'S
TURNER STATION
Enterprise, Florida

Unit No. 4 is a 600/000 lb/hr
RILEY TURBO FURNACE BOILER

Design Pressure — 1750 psig
Superheat/Reheat — 1000°F
Fired by Natural Gas and Oil
Efficiency up to 90% on oil — 86% on gas.

BLACK & VEATCH
Consulting Engineers



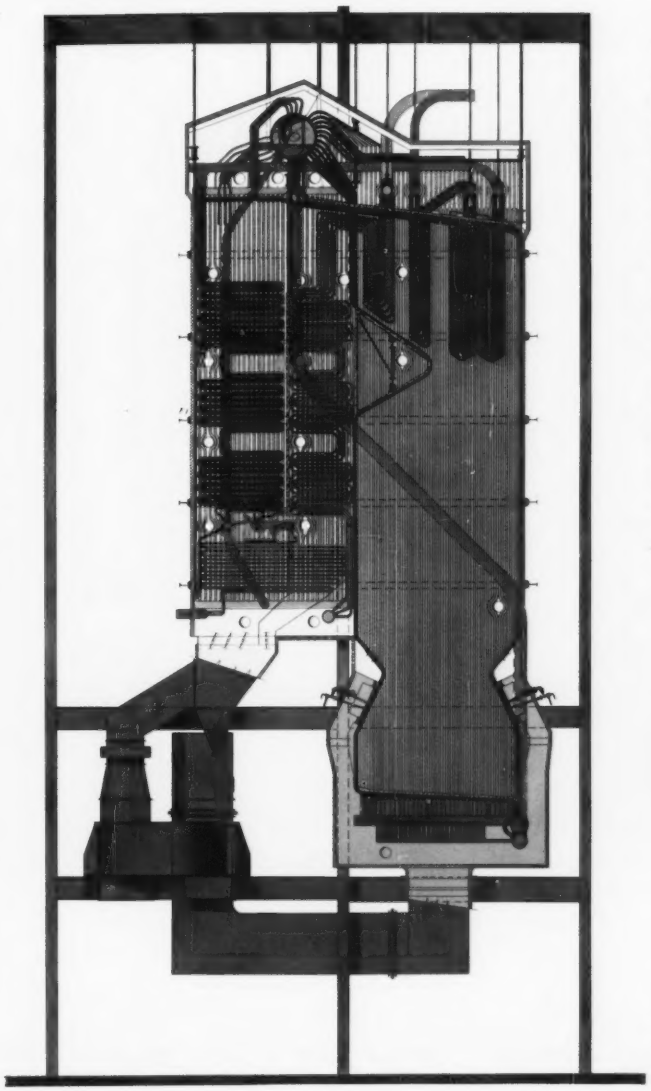


RILEY TURBO FURNACE

produces extremely uniform furnace exit temperature at

FLORIDA POWER CORPORATION

Uniform, safe gas temperatures across the full span of a boiler's high temperature superheater and reheater is a vital requirement for trouble-free operation. With a Riley Turbo Furnace this objective is attained . . . without use of costly auxiliary methods for distributing furnace gas.



In the Riley Turbo Furnace all fuels — gas, oil, coal — are burned at the base of the furnace well away from superheater and reheater with combustion taking place evenly from side wall to side wall. Combustion gas rises within the furnace envelope in a uniform side wall to side wall column resulting in minimum variation in metal skin temperatures of all superheater and reheater elements. Temperatures are well within safe alloy limits to assure long tube life. Proof of such performance is provided in the accompanying curves. Flame contour diagrams illustrate combustion uniformity at each load level.

The Turbo Furnace boiler is capable of operating over a 6-1 load range with oil or gas firing with all burners in service on automatic control and without burner adjustment. Design and operating characteristics of the Turbo Furnace also provide more rapid and uniform water and steam circulation, help to maintain a clean furnace, and minimize flyash and air pollution problems.

RILEY

STEAM GENERATING AND FUEL BURNING EQUIPMENT

RILEY STOKER CORPORATION
WORCESTER, MASSACHUSETTS

SALES OFFICES:
Boston, Charlotte, Chicago, Cincinnati, Cleveland, Denver, Detroit, Honolulu, Houston, Jacksonville, Kansas City, Los Angeles, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Salt Lake City, San Francisco, St. Louis, St. Paul, Seattle, Syracuse.

ALLIS-CHALMERS

Extended Foil Capacitors

A-1473

4800-kvar Allis-Chalmers capacitor enclosure with provision for future expansion to 6000 kvar.

Install an Allis-Chalmers CAPACITOR ENCLOSURE where

appearance and dependability count

Allis-Chalmers enclosures are complete:

- Shipped assembled with 50 kvar capacitors, fuses, controls, current and potential transformers, switch and incoming line termination.
- Capacitors individually fused.
- Fans in each modular section thermostatically controlled.
- Mechanical interlocks insure a closed grounding and shorting switch before cubicle doors can be opened.
- Dead-front control compartment isolates the circuit breaker and grounding switch.
- Vacuum switch or circuit breakers can be supplied.
- Roof entrance bushings or pothead for underground cable is available.
- Viewing window in rear of entrance cubicle for visual check of grounding switch position.
- Outdoor metal enclosure with three coats of paint.

Specify **Allis-Chalmers** *extended foil capacitors! Call, wire or write your nearby A-C office.*

Capacitor enclosed equipment available for 2400 through 13,800-volt, three-phase service, up to 6000 kvar. Allis-Chalmers also offers outdoor stack-racks and pole-mounted racks as well as current and voltage sensitive controls.

Allis-Chalmers extended foil design capacitors withstand higher inrush currents. Current densities are lower at point of contact between the packs and the contact plates than is possible with conventional tab-type capacitor construction.

JUNE 19, 1961

New Frontier Snaps into Focus

The electric power policy of the New Frontier today stands forth in sharp, crystal-clear focus. The executive branch of the federal government—with all its departments, bureaus and administrations—is committed irrevocably to a strong coordinated campaign: To activate and expand non-investor electric power on every front and in every area.

When the new Administration took office, it promised full cooperation to the business community. The electric power sector of that community had obvious suspicions that it was not included. Yet, it adopted a wait-and-see attitude.

Indeed, the olive branch was extended quickly. The Secretary of the Interior, his feet hardly planted behind his desk, said: ". . . we have a mixed system . . . the overlap is a very healthy one in many areas. I am not doctrinaire . . ." This was the party line, displayed copiously by new officials—in confirmation hearings—and from every available rostrum.

It is now clear that the expressions of sincere togetherness were but part of a deliberate attempt to buy time. Time—to get new appointees in place, to roll old and new plans, to synchronize a truly coordinated team effort. This accomplished, the aura of sweet reasonableness faded, slowly but perceptibly. It was replaced by a gradual hardening of attitude toward investor power.

In place of the soft word came the harsh denunciation. In place of the call for cooperation came the unanswered letter, the unreturned phone call, the refusal to correct blantantly incorrect statements and calculations. In place of the spirit of negotiation, came the callous attitude that no logic or economics will stand in the way of the forward move of public power.

When did the image first focus? Probably at different times for different people. For us, perhaps when the REA Administrator stated, last month, his new "third criterion" for G&T co-op loans: when the security of the cooperative principle is threatened. Or maybe it was when the President sent the IJC's rejection of the pathetic Passamaquoddy scheme back for still another look. We'd hoped that the popular young President might in time checkrein his administrators, but the 'Quoddy incident seems to have dashed this hope.

It is academic as to when the investor-owned industry came to full realization of the depth, breadth and intensity of the federal schemes. Today, it has no illusions. Once again, it faces a battle for survival, and it knows it.

The recent convention of the Edison Electric Institute showed this conclusively. While the program, unfortunately, was not designed to pinpoint this situation especially, the side-talk, the committee meetings, and the general activity of the top executives of the industry gave emphasis to their awareness and deep concern over the upcoming battle.

And the convention showed, too, that the industry today has never been stronger and so well-equipped for such a battle. What's more, the spirit displayed gave ample notice that the will to win is there.

The industry's great, dominant need is for leadership. Only through leadership can the indispensable qualities of strength and will be amplified, focused and timed properly. Only through leadership can the battle be won.

Breaker Failures Bring Outages

Midtown New York powerless for 4½ hours at end of business day. San Francisco tied up by Mission Substation blast

Failure of bushings in two 13.8-kv magnetic-air circuit breakers associated with the 69-kv bulk supply to Con Edison's new West 65th Street Substation last Tuesday was blamed for an outage that interrupted service to four mid-Manhattan network areas for 4½ hr.

The outage came at 5:05 pm as home-bound office workers jammed New York's subways and elevators at the end of the hottest June 13 since 1892. The temperature reached 96F at 1:55 pm, and Con Edison's 1-hr peak load had set a new record of 4,431 Mw.

Network areas affected were Hunter and Sutton on the East Side, and Plaza and Columbus Circle on the West Side. The two East Side areas are supplied from the East 63rd Street Substation over 13.8-kv distribution feeders; the two West Side areas at 13.8-kv from the West 65th Street Substation. Bulk power to both substations comes from Queensbridge Switching Station via six 69-kv feeder cables to East 63rd Street, and four of these continue to West 65th Street Substation.

With failure of service to these four network areas, total load interrupted was about 360 Mw, representing some 119,000 meters, according to the company. Design capacity of the West 65th Street Substation is 210 Mva, that of the East 63rd Street Substation 250 Mva.

Trouble started at 3:31 pm when a bushing failure occurred in the 13.8-kv magnetic-air circuit breaker of transformer bank No. 2 at West 65th Street. This fault was automatically cleared by transformer and bus differential relays. The clearing of this fault also tripped a Queensbridge breaker and a transformer bank breaker at the East 63rd Street Substation, but no interruption of service occurred.

A similar fault occurred at 5:05 pm on the transformer bank No. 1 breaker at the same West 65th Street Substation. It too was cleared by bus and transformer differential relays. The operation tripped another Queensbridge breaker and a bank breaker at East 63rd Street.

This action in turn de-energized the remaining two banks at West 65th Street, shutting down the substation and causing an outage to the Plaza and the Columbus Circle networks. It sequentially operated the remaining Queensbridge breakers and transformer bank breakers at East 63rd Street, causing an interruption to the Sutton and Hunter networks as well.

A preliminary inspection of the defective magnetic-air, 3,000-amp, 1,000 Mva, 13.8-kv breakers by Con Edison engineers indicated failure of the breaker terminal bushing. One breaker cubicle required replacement of one stationary contact insulator. Spare breakers were available. Further inspection and analysis are required to determine the cause of the failure.

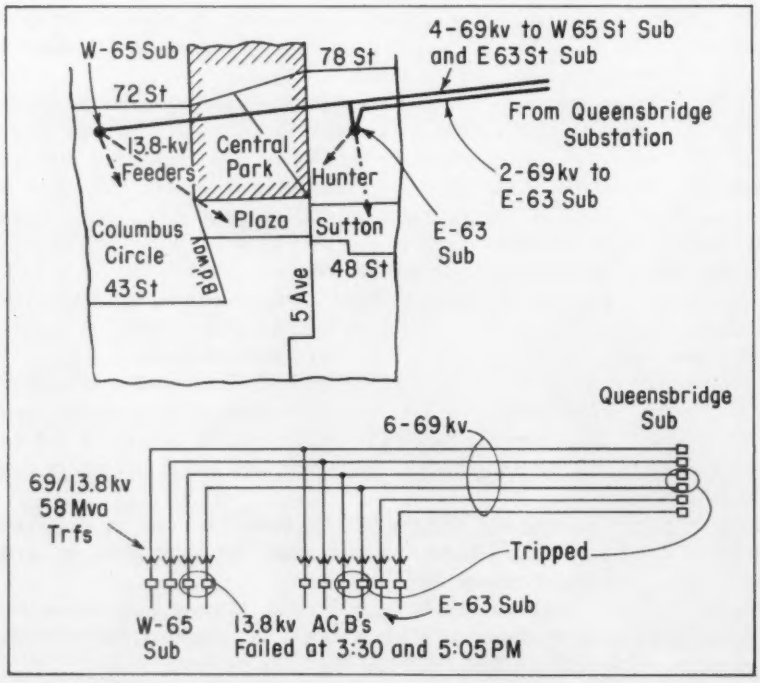
The Sutton network was restored to service at 7:31 pm, the Hunter network at 8:05 pm. The Plaza network was restored at 8:34 pm and the Columbus Circle network at 9:27 pm. At the time of restoration, load had been reduced from the 360 Mw at time of interruption to about 170 Mw. Most reductions were the result of normal load decline as the area's peak is during the normal working period.

Although the temperature rose to 96F during the afternoon, there is no apparent relation of the heat to this failure, Con Edison spokesmen stated. The breakers were operating at 75% of rating at initial failure, 97% of rating at the time of second failure.

The instantaneous load on the Con Edison system declined steadily during the afternoon of the outage. It was 4,470 Mw at 4 pm; 4,460 Mw at 4:30 pm, and 4,320 Mw at 5 pm.

Attributing the power interruption to the failure of two electrical switches in the W 65th Street Substation caused by "the breakdown of insulation in both switches, not to any load exigency," H. C. Forbes Con Edison, Chairman, noted that 14 similar switches were still in use elsewhere. He added:

"Certain alterations will be made



SIX 69-KV CABLES from Queensbridge Switching Station supply mid-Manhattan's east and west side substations feeding four networks, Central Park lighting

in the scheme of circuit protection so that so unusual a coincidence of failures as the one of yesterday evening will not cause a service interruption again. The company is exploring the cause of the insulation failure with representatives of the manufacturers of the switches to find a means of remedying the apparent weakness."

San Francisco Has Trouble

A circuit breaker explosion in a downtown Pacific Gas & Electric Co substation on the same day blacked out a large area of San Francisco shortly before the end of business. Two operators were injured slightly.

The explosion came at 4:15 pm, and power was fully restored at 4:50 pm. Work in most office buildings halted abruptly, as lights went out and office machines and elevators—many carrying passengers—stopped. Rush-hour traffic became a tangle, and police were rushed in from other areas to help control traffic. Market Street streetcars ran without interruption.

Television and radio stations were off the air for 32 min. Hospitals, Pacific Telephone & Telegraph Co, and other essential services were supplied by emergency generators which cut in automatically when power failed. Many big hotels and stores burned candles in the lobbies.

The failure occurred in the 110/12-kv Mission Substation and knocked out three networks. Two were underground networks supplied from two substations, each with two sources of supply from the Mission Substation. Four circuits to the two networks supplying the financial and hotel districts went out simultaneously. The third network was that south of Market Street. It supplies the area from Third Street to the waterfront, including large office buildings. This failure resulted from normal functioning of protective equipment.

Rumors on the New York City radio of a outage in Philadelphia proved groundless. Although lightning tripped out two 66-kv lines near Norristown at about 2 pm., the lines were back in service within 1 min, and company spokesmen reported no customer outages. Philadelphia Electric Co recorded a new system peak of 2,706 Mw during the afternoon.

Six Manufacturers Indicted

Indictments against six major manufacturers of pole line equipment for price rigging charge that competition throughout a large share of the US was "restrained, suppressed and eliminated."

The indictments are returnable at 10 a.m. June 26, before Federal Judge Robert E. Tehan at Milwaukee Federal Court. They were issued by a Milwaukee Grand Jury, June 6 at the request of the federal Antitrust Division. Defendants named are Oliver Electrical Mfg Co, Utilities Service Co, Hubbard & Co, McGraw-Edison Co, Joslyn Mfg & Supply Co, and A. B. Chance Co.

Wallace Kirkpatrick, first assistant in the Justice Department's Antitrust Division at Washington, said the indictments were issued in Milwaukee partly because one defendant, McGraw-Edison Co of Elgin, Ill, owns Line Material Industries in Milwaukee. Line Material makes the type of equipment referred to in the indictment.

The six defendants make 75% of all pole line hardware east of the Rockies. According to the indictment, the hardware was overhead and underground line hardware, used in the construction and maintenance of electrical transmission, distribution and communication lines, when made from malleable iron or carbon steel, but not alloy steels or non-ferrous metals. The defendants allegedly sold more than $30 million of the materials a year.

The indictment said they engaged in an unlawful combination and conspiracy throughout the market area in restraint of trade and in violation of the Sherman Antitrust Law. The six manufacturers allegedly agreed "to fix and maintain uniform and noncompetitive prices for pole line hardware and to adopt and maintain a uniform system of discounts."

The grand jury said the firms' representatives, although none was named, met regularly to establish uniform and noncompetitive practices in hardware distribution. Prices were thus kept, the grand jury charged, at artificially high levels. Distributors, it added, have been denied the right to receive competitive bids.

OEEC Reports on European Power Growth

After bouncing up 8.9% in 1960, demand for electric power in Europe should level off at an annual growth rate of 7.2% through 1965. The Organization for European Economic Cooperation made this prediction in a recently published report.

According to the report, total power production in 1960 was 529.9 billion kwhr. This is a 9% increase over 1959. In 1965 it may reach 654 billion kwhr.

Peak capacity of European electric generating plants moved from 134,700 Mw in 1959 to roughly 145,200 Mw in '60. In five years, according to the forecast, capacity will be at 193,340 Mw.

Salient trend of the five-year period will be the increased emphasis on nuclear generation. Nuclear power stations represented 0.3% of capacity in 1960, but should move up to 2.3% by 1964.

Coal remains the prime fuel for Europe's thermal plants. High-grade coal alone accounted for slightly more than half the estimated 320 billion kwhr produced in thermal plants in 1960. Add inferior grades in and coal's share moves up to 257 billion kwhr, more than three-fourths of the total thermal production, and some 50 billion kwhr more than total hydro production.

To keep up with the growing demand, Europe's utilities plan whopping investments in plant and transmission networks. The aggregate annual investment—split 60% for production and 40% for transmission and distribution—rose steadily from $3.2 billion in 1956 to $4.0 billion in 1960. The OEEC report indicates that investment will steady at about $4.3 billion annually over the next five years. The leveling off, according to the report, is due to increases in unit capacity that lower cost per installed Mw.

AEC Licensing Process Passes Fermi Court Test

Supreme Court upholds AEC's multi-step process for issuing licenses for construction and operation of nuclear plants.

Test case arose when unions challenged the legality of AEC's construction permit for Enrico Fermi reactor (left)

The right of the Atomic Energy Commission to permit construction of a nuclear power reactor on lesser safety regulations than it will require for operation has been upheld by the US Supreme Court.

Thus ends a case that has been argued in the AEC and the courts since 1956, when three AFL-CIO unions—the electrical workers, the auto workers and the papermakers—objected to an AEC decision granting a construction permit to Power Reactor Development Co (PRDC) for a fast breeder reactor at Lagoona Beach, Mich. PRDC is composed of 21 investor-owned utilities headed by Detroit Edison Co.

The $80-million reactor, which will produce plutonium as well as power, is being built within 35 miles of Detroit and 30 miles of Toledo, in an area with a population of about two million. AEC, in granting the construction permit, said PRDC would have to return with safety proof before it would be granted an operating license.

This is where the unions entered into the case. They argued that AEC should have required the same safety guarantees for the building permit as it intended for the operating license. The Court of Appeals for the District of Columbia upheld the union contention.

Court Supports AEC

By a 7 to 2 decision, the Supreme Court said the Court of Appeals erred in setting aside the construction permit. It agreed with the government's argument that elimination of the "two-step" system of authorizing reactors would impair the development of nuclear power.

Justice William J. Brennan, Jr, writing the majority opinion, said:

"PRDC has been on notice long since that it proceeds with construction at its own risk, and that all its funds may go for naught. With its eyes open, PRDC has willingly accepted that risk, however great . . .

"It may be that an operating license will never be issued. If one is, that will not be the end of the matter. The respondents may have judicial review. Moreover, the Commission's responsibilities for supervision of PRDC continues . . . operation at full power (100 Mw) will not be permitted until several steps of gradually increasing operation have been successfully mastered, with a full public hearing at each step, and no further advance permitted without the AEC's being fully satisfied that a step-up will meet the high safety standards imposed by law.

"This is the multi-step scheme which Congress and the Commission have devised to protect the public health and safety. We hold that the actions of the Commission up to now have been within the Congressional authorization. We cannot assume that the Commission will exceed its powers, or that these many safeguards to protect the public interest will not be fully effective."

Justices William O. Douglas and Hugo L. Black disagreed. Justice Douglas, writing the dissent, said, "The finding on safety, if it is to be made (as it assuredly must be), must be made at the time the construction permit is issued or not at all."

Douglas said the AEC two-step method presupposes—"contrary to the promise of the (Atomic Energy) Act—that safety findings can be made after construction is finished."

"But when that point is reached" he wrote, "when millions have been invested, the momentum is on the side of the applicant, not on the side of the public. The momentum is not only generated by the desire to salvage an investment. No agency wants to be the architect of a 'white elephant.' Congress could design an act that gave a completed structure that momentum. But it is clear to us it did not do so."

Approach Called 'Light-Hearted'

Douglas wrote that the "legislative history makes clear that the time when the issue of safety must be resolved is before the Commission issues a construction permit. The construction given the Act by the Commission (and today approved) is, with all deference, a light-hearted approach to the most awesome, the most deadly, the most dangerous process that man has ever conceived."

The PRDC reactor is the first of its specific type to be built. But the government argued that about 115 nuclear reactors have been in operation in the past and many have some of the same characteristics as that being built at Lagoona Beach, on the shores of Lake Erie.

Justice Brennan, reviewing the history of the Atomic Energy Act, said "It is clear from the face of this statute—and all parties agree—that Congress contemplated a step-by-step procedure. First an applicant would have to get a construction permit, then he would have to construct his facility, and then he would have to ask the Commission to grant him a license to operate the facility.

"We think the great weight of the argument supports the position taken by PRDC and by the Com-

mission"—that a definitive safety finding can be deferred until operation is actually licensed.

"The Commission, furthermore, had good reason to make this distinction," wrote Brennan. "For nuclear reactors are fast-developing and fast-changing. What is up to date now may not, probably will not, be as acceptable tomorrow. Problems which seem insuperable now may be solved tomorrow, perhaps in the very process of construction itself."

He also noted that no change in the AEC procedure ever had been suggested by the Joint Congressional Committee on Atomic Energy, "although it has on occasion been critical of other aspects of the PRDC proceedings not before us."

"It may often be shaky business to attribute significance to the inaction of Congress, but under these circumstances, and considering especially the peculiar responsibility and place of the Joint Committee on Atomic Energy in the statutory scheme, we think it fair to read this history as a de facto acquiescence in and ratification of the Commission's licensing procedure by Congress.

"This same procedure has been used in each of the nine instances in which the Commission has granted a provisional construction permit for a developmental nuclear power reactor . . . and we hold that it was properly used in this case."

The Court majority found that "Issuance of a construction permit does not make automatic the later issuance of a license to operate."

Board Probes SL-1 Blast

The three-fatality SL-1 nuclear reactor accident in Idaho last January was probably caused by forceful extraction of the reactor's jammed central control rod, according to the Atomic Energy Commission's latest findings.

A special board of inquiry appointed by AEC General Manager A. R. Luedecke said a considerable amount of doubt concerning the explosion remains, however. The inquiry board, headed by Curtis A. Nelson, definitely ruled out a chemical hydrogen-type explosion or sabotage as probable causes.

Evidence of control rod blades sticking was available before the accident occurred. About a 20-in. withdrawal of the big central rod would have been necessary to trigger the nuclear excursion. AEC suggested as an early hypothesis that one or more of the military operators were exerting upward force on the jammed rod when the minimum distance was accidentally overshot. The Nelson board said:

"While there is no direct evidence that this occurred (human withdrawal of the control rod to engage it to rod drives), the necessary conditions and actions appear, at the present time, to be less implausible than those required for any other hypothesis suggested."

The safety findings said of design and operating procedure:

- "The incident could not have occurred if the amount of withdrawal or rate of withdrawal of the central control rod had been positively limited by mechanical restraint or by operational procedure;
- "A specific procedure for the actual operation of assembly and disassembly of the control rod drives, containing clear warning and explanation of the possible hazard associated with lifting the rod (rather than only the mechanical steps contained in the training procedure), might have reduced the magnitude or rate of displacement of the central rod during reassembly sufficiently to prevent the occurence of the incident."

Definite responsibility for the explosion is not linked by the board to any one party or group out of those with operating duties over the reactor. But the board judged the reactor was imprudently operated, after boron corrosion was observed last fall to have increased SL-1's neutron reactivity dangerously:

"Before the incident occurred, the condition of the reactor core and the reactor control system had deteriorated to such an extent that a prudent operator would not have allowed operation of the reactor to continue without a thorough analysis and review, and subsequent appropriate corrective action, with respect to the possible consequences or hazards resulting from the known deficiencies."

The complexity of AEC's operating chain of command over SL-1 was criticized by the findings of the board.

Series of Design Revisions for Nez Perce Proposed

Washington Public Power Supply System has proposed a series of design revisions for its Nez Perce Dam application, pending before the Federal Power Commission.

The WPPSS revisions, however, came during a period reserved in the Nez Perce-High Mountain Sheep hearings for final rebuttal arguments. Whether they will be permitted in the record at this late date—more than a year after the original Nez Perce filing—is up to FPC examiner William Levy. He hasn't ruled yet, but chances are good that Levy will permit the new testimony: **(1)** in order to expedite the case, and **(2)** because applicants have leeway in design changes even after licenses are granted.

Pacific Northwest Power attorney Hugh Smith chided WPPSS that the only "rebuttal" angle in the design revisions is that WPPSS is rebutting its own previous engineering testimony.

Simply, the Nez Perce revisions have moved the initial and future power houses from the foot of the dam into underground locations on each side of the dam; the spillway is moved from the right abutment to the center of the dam; the dam is shifted slightly on its site, and downstream fish collecting points are moved farther downstream.

William R. McGill, vice president of Wainwright & Ramsey, Inc, testified that the changes would reduce Nez Perce's cost by nearly $44 million; from $340.9 million to $297 million.

Final rebuttal arguments could take at least a couple of months, mainly because of the added new testimony on Nez Perce revisions. Then the case will be turned over to Levy for intermediate ruling.

EEI 29th Annual

Government Power Growth Dominates

- Russia's electrical industry rate of growth compared with that of the United States
- Research and development progress is considered an essential to improve competitive situation
- Today's management should assume responsibility for selecting and training tomorrow's leaders

PHILIP SPORN

It was almost in the nature of things that a scathing criticism of electric utility leadership should have dominated the 29th annual Edison Electric Institute Convention held in New York City earlier this month.

The mood of the 1,500 electric utility executives attending the large meeting at the Waldorf-Astoria was restless and uneasy. Despite the fact that most of them were racking up new records in sales, revenue, and return, there was the perceptible air of concern.

The renewed threat of federal expansion in the electric power field hung like a blanket of harbor fog over every talk and every action. Even while respected industry executives spoke from the flower-bedecked rostrum of the grand ballroom, there was the knowledge that others of their colleagues were carrying on the battle against federal encroachment from witness stands in Washington, or preparing testimony for such use in small rooms in the same elegant hotel.

The official program of addresses, planned months previously, sought to offer a balance of facts and inspiration in a variety of areas: politics, research, nuclear power, selling, management, and financing. If the inspirational speakers failed to hit the target, it was perhaps because the audience wanted something different—some hard suggestions on how to handle a situation already at the kindling point. There was the desire, often unexpressed, that from the mass of oratory would come new ideas, new leadership which would help stem, blunt, or even reverse the reborn government drive for dominance in electric power transmission and generation.

A hint of the sense of urgency, widely felt, came in the final hour of the convention, when the new EEI President, Philip A. Fleger, told a waning audience, ". . . recent developments in our national capital indicate that, in the very near future, we may have to act with even greater unity and with even greater awareness of national problems affecting us than we have in the past." (See interview p 58.)

Sporn Calls for Strong Leadership to Combat Encroachment

Sharper words demanding a new vigor in leadership and a sweeping re-examination of present approaches had come a day earlier in an address by Philip Sporn, president of American Electric Power Co. In a wide-ranging talk that touched many a sensitive nerve, the controversial Sporn offered a long series of suggestions and criticisms aimed directly at the executives before him.

Sporn asserted that the idea of private enterprise in power is saleable and that it is possible to convert people in Congress from a previously-held point of view. But he taunted his colleagues, ". . . there has been less and less tendency for the people of the industry, the heads of various power enterprises, to defend their positions and their interests vigorously and in person. He further emphasized the importance of "in person"

Convention

Convention Mood

appearances, saying that the industry should not rely too heavily on professionals or on indirect methods to get its message across to Congress. He even suggested that EEI would do well to hold its conventions in Washington and invite government officials as speakers.

The growth of public power has again and again been abetted by the industry's lack of alertness to both its opportunity and responsibility, Sporn argued. He noted that half of the total generation of the Tennessee Valley Authority represents the supply to the Atomic Energy Commission, and indicated this might have been different if the investor industry had demonstrated earlier that it could offer service and rates that were competitive.

Attacking on still another front, Sporn warned against complacency in attitude toward rate increases. He said that the idea that price is no object or that service is already a good bargain is not "good sense, nor good social-economics. . . ." He predicted that if this philosophy should become dominant, the public may move to socialized power.

But not all of Sporn's criticism was related to the government power issue.

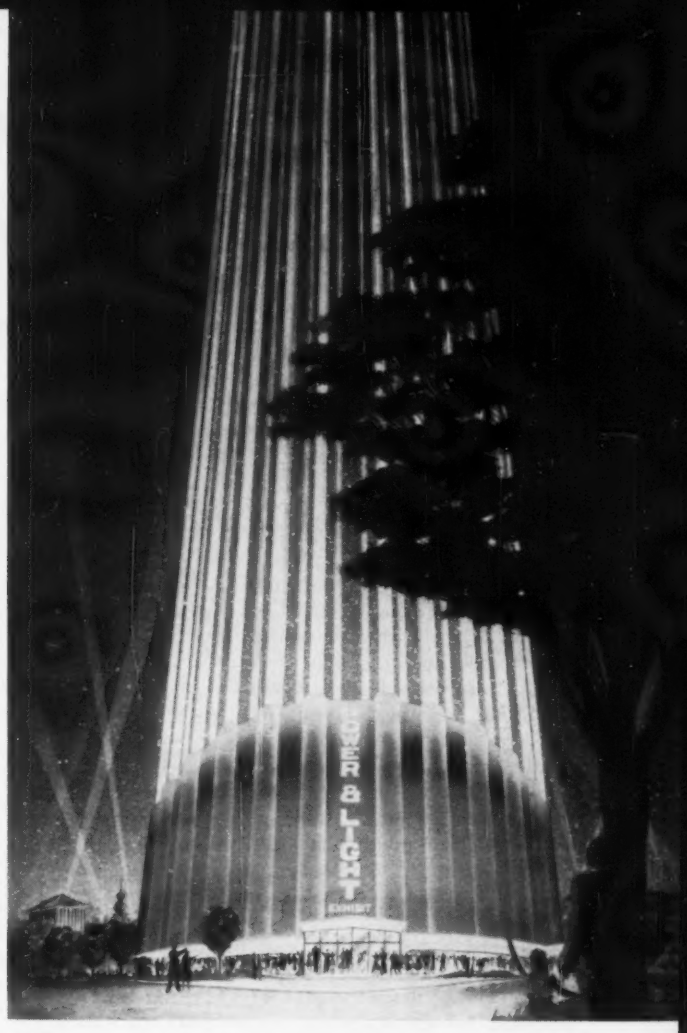
He blasted an industry report on research, first because it was done by an outside consultant, "Are we so talent poor" that such work can't be done by an industry group? Second, he hit the report because it did not recommend that the industry take the initiative in the research and development of new technology. "If a revolution is in the making let the industry make that revolution, or someone else will make it for us," Sporn said.

In still another area, he said the utility industry must do more to make a utility career "an exciting adventure for our very bright and able people."

In the field of marketing, Sporn called on his colleagues to concentrate on selling electricity as the universal energy source, and questioned how they could remain neutral as between the sale of gas and electric power.

It was this sharp, probing commentary that focused the attention of the EEI delegates and made Sporn's remarks the frequent topic of corridor conversation.

But the theme of advancing government power occurred in talks by a number of other speakers.



A TOWER OF LIGHT (above) constructed from the beams of twenty-four one-billion-candlepower searchlights will be the highlight of the investor-owned electric utility companies' exhibit at the 1964-1965 New York World's Fair.

Described as "the greatest concentration of light ever generated," the tower of light is expected to be visible from as far away as Boston and Washington, D. C.

News of the exhibit was presented during the EEI Convention by Ernest R. Acker, chairman of the EEI World's Fair Committee and president of Power and Light Exhibit, Inc, the company set up to administer the electric companies' participation in the fair. Acker, who is also chairman of Central Hudson Gas & Electric Corp, said the "tower" will be based in a rainbow-colored building 80 ft high, located on the main traffic artery from the principal entrance to the fair.

Inside the building, visitors will be conveyed on a moving ramp to the top floor. From there they will begin a spiral walk downward, across flat exhibit floors separated by ramps or steps.

The displays themselves have not yet been finally determined because, Acker said, new inventions and developments in the electric industry "come so fast that we cannot firm up our overall exhibit plan until the last possible moment. What we view as exciting and futuristic in 1961 may be only comfortably old-hat in 1964."

The Power & Light, Exhibit, being designed by V-E-K Associates, will cost about $6 to $7 million, Acker said.

Russian Progress Reviewed;

Sherman R. Knapp, outgoing EEI president, and president of Connecticut Light & Power Co, in gaveling the convention to order, warned that government ownership and operation of the nation's electrical industry is the constant ambition of many people in government, and that they are clever enough not to say it publicly which makes them even more dangerous.

Knapp compared elaborate plans of the Interior Department with ideas expressed by Stephen Raushenbush in 1927, in a socialist paper, where a concept of a giant power system would lead to government control of the power industry.

On the same subject, Dr Emerson Schmidt, director, Economic Research Dept, US Chamber of Commerce, said government accounting and investment base allocations hide facts from the public in the case of federal power projects. He related an incident where a senator from the Tennessee River Valley told a Washington audience that the test of fairness of their electric rates would be the TVA rates.

"Either he was ignorant of TVA's subsidies and the accounting and statistical facts or he merely traded on the ignorance of his listeners," Dr Schmidt said.

J. K. Horton, president of Southern California Edison Co, though he was talking mostly about marketing practices, mentioned the "increasing encroachment of socialized power," and pointed out that there is evidence that the investor-owned story has not been effectively told to the public.

From Albert L. Cole, vice president and general manager of *Reader's Digest,* came the conclusion:

"In spite of the wonderful job the electrical industry has done for the American people and your efforts up to date to communicate that fact to the American people, I hope you will redouble your efforts in that direction in the future, and be more effective than ever. This is because I hope very much that it will never be necessary for my family, my business, or anyone else in America in the future to have to secure their electric service from any government."

EEI's vice president and managing director, Edwin Vennard, said, "All of the power capacity to meet America's needs could be financed in the free market. There is no need for the government to spend anything for America's power needs. This is something for Americans to ponder in light of the present high demands for government spending in other categories."

Though growth of government power was recognized as an ever-increasing threat by many, methods of slowing or stopping the growth were noticeably absent from discussions.

One idea, having to do with keeping the public informed on the situation, came from Andrew Heiskell, board chairman of Time, Inc. He suggests that arguments against federal power projects are weakest when confined to the areas where power consumers benefit from the project. Referring to the Colorado River Storage Project and the proposed government transmission lines there, he said ". . . it would seem to me far more effective to tell the Pennsylvania taxpayer that he is being hurt by a Colorado power project than to tell the same story to a Colorado taxpayer for whom the benefits may be greater than the cost."

"Government in a democracy is a sensitive tool, and it picks up signals from every corner of our nation, then amplifies the signals it has received into a great swelling chorus of public opinion and reaction."

Wide Spread in Progress Between US and Russian Power Industries

Vennard, in comparing the rate of growth of the electrical industries in the US and Russia, presented convincing arguments that not only is the Russian industry much smaller, it is not growing as fast as ours.

"Russia is now going through the process of mechanization and electrification of industry that we went through some 25 or 30 years ago," Vennard said. "She realizes, as do we, that machine production is essential if a society is to produce an abundance of the goods and services."

Total production in the US is about 2½ times that of Russia, according to Vennard.

In short, though Russia concentrates on modernizing essential industries, there is no general increase in the use of residential and commercial electricity because there is no sales effort, nor would there be an adequate supply. The picture derived from Vennard's talk is that the Russian electrical industry will never catch up with the US, if the US electrical industry continues to progress at its historical rate. However, he warned against complacency, because Russia is "a

HORTON

VENNARD

COLE

HEISKELL

Research and Development Moves Ahead

Reddy Kilowatt Awards Announced

Philadelphia Electric Co won the top Reddy Kilowatt award for the over-all excellence of its annual report. Ashton B. Collins (left), president of Reddy Kilowatt, Inc, presents the plaque symbolic of the award to George Conover, Philadelphia Electric vice president.

Other winners were: Class A, Consumers Power Co; Class B, Arkansas Power & Light Co; Class C, Hawaiian Electric Co; Class D, Southern Nevada Power Co; Holding companies, American Electric Power Co; outside the US, Shawinigan Water & Power Co.

Fifteen other utilities won honorable mention awards in the annual contest.

threat to our well-being and our way of life. From the economic standpoint we should constantly appraise our position and be prepared to make every possible advancement and improvement."

Vennard said competition is one of the important factors in keeping America's industry ahead.

"Under the government-planned economy, as in Russia, the individual is not free as he is subservient to his government. He is subservient because he is dependent upon government for the goods and services he needs for his well-being. Under the free economy the individual is not dependent upon government for his welfare; therefore he is not subservient to government and therefore he is free—free from government. Let us carefully guard against inadvertently gravitating towards the government-planned economy with its lower production."

Research and Development Progress Reviewed for Delegates

Research and development received its share of attention from convention speakers. Lead-off man on this subject was Willis Gale, board chairman of Commonwealth Edison Co, and chairman of the relatively new EEI Research Division Executive Committee.

Funds available for EEI's research program in 1961 total just under $600,000, which Gale said is about 86% of the potential total. Last year's budget was only $238,000.

Gale said, "One must constantly bear in mind that $600,000 is a very small figure for an industry as large as ours. I do not mean that we ought to increase the figure other than by adding to the participants, but I do suggest that the figure by itself places a definite limitation on the kinds of things we can get into."

He recommended that product research should be carried on by manufacturers except in cases where there is a limited market for very specialized products—such as an instrument for measuring the opacity of stack plumes.

The quest for new power sources has led to several possibilities, according to Leonard J. Linde, director of engineering services for Allis-Chalmers Mfg Co.

Two of these he reported on are magnetohydrodynamics (MHD) and fusion power.

Research with MHD shows a possibility of generating power for 5¾ mills per kwhr, Linde said, by burning powdered coal at ionizing temperatures of

BESSE

SCHMIDT

GALE

LINDE

Atomic Generation, Marketing,

about 5,000F. A detailed design study of a 300-Mw MHD generating station has been completed, and Linde said a complete cost of $170 per kw can be foreseen. He said a useful plant might go on the line in 1975 or 1976. It would have a heat rate of 6,500 Btu per kwhr.

Fusion power is not as close to realization, Linde said, because the establishment and control of a fusion reaction are difficult. Also, initial research has established that the economic minimum capacity of a fusion plant would be about 5,000 Mw, and "such a concentration of power might find limited applications in today's markets."

Transmission research is accelerating along with increasing interest in interconnections and power pooling, reports James F. Young, general manager of General Electric's electric utility engineering operation.

Young recommended that research efforts should be directed to one EHV level instead of two, and that 500 kv should be established as an international standard. He forecasted that 500 kv would be in use by 1965, and 700 kv by 1975.

Rebuilding of America's urban centers, plus increased use of electricity in general, are going to demand more research in the distribution field, too, according to Dr J. A. Hutcheson, vice president in charge of engineering for Westinghouse Electric Corp.

"It seems obvious that we cannot hope to superimpose the kind of distribution we have today on top of this clean-cut, super efficient community of tomorrow," he said. He expressed confidence that the industry will keep pace with progress, but warned that lead time is growing short.

Edwin Vennard, while comparing Russian progress with the US electrical industry, referred to research. Both countries, through research, have made dramatic advances in thermal generation—but aside from that there is little similarity either in size or rate of growth of the two industries. Latest Russian estimates are that the per capita use of electricity for 1970 will be about 3,000 kwhr, while the use in the US is expected to be around 7,500 kwhr per capita.

Electrical Industry Attitude Will Influence Atomic Future

Developmental research is most dramatic in the US in the atomic energy field, where at the end of 1960 129 investor-owned electric companies were involved in 25 nuclear power projects, using seven reactor types. So far as is known, Vennard said, Russia has only four reactor types.

Maj Gen K. D. Nichols, US Army, retired, and a consulting engineer in Washington, D. C., told the convention that competitive nuclear power in areas where fuel costs run 35¢ per million Btu or more can be achieved before the Atomic Energy Commission target date of 1968. This prediction is related to building water-cooled and water-moderated plants, and to making certain decisions now.

He said one of the problems facing the utility industry is that no one of the reactor types stands out yet as the obvious or final answer to the most economic power. And in closing, he said, "The attitute of the power industry toward support of this new industry may not only effect the rate of achievement but also the extent and nature of government participation in the program."

Live Better Electrically Moves On With New Campaign Plans

A motivation research study conducted for the Live Better Electrically program concluded that the movement is strongly toward total electric living, according

New EEI Officers Congratulated by Sherman Knapp

Taking over the reins of EEI for the coming year are Philip A. Fleger (center) who was named president, and W. W. Lynch (right) who is vice president. Fleger is chairman of the board and president of Duquesne Light Co and Lynch is president of Texas Power & Light Co.

The new officers are pictured with Sherman R. Knapp, president of Connecticut Power & Light Co, who is winding up his stint as president.

Fleger, who has a distinguished utility career of 35 years, said in accepting the new duties that he regards it as more than an honor—that he regards it as an opportunity, as he has regarded other milestones in his career. For more of the new president's views, see the interview on p 58-59.

and Financing are Discussed

to William M. Shepherd, vice president in charge of sales for Arkansas Power & Light Co, and chairman of the EEI Live Better Electrically policy committee.

Shepherd said 1962 plans will follow the same basic pattern as 1961, with almost one consumer-directed ad a week. Magazines used will include *Life, Saturday Evening Post, Better Homes & Gardens, American Home, and Readers Digest*. This list of publications reaches every economic level, every type of reader, and reaches more than 70% of all US households, Shepherd reported.

Two new LBE research projects are now underway—one is on electric house heating, and the other is a basic consumer attitude study.

Quality of Tomorrow's Managers Depends on Today's Leaders

"There is nothing we can do about the performance of past management or the qualifications of today's management. But tomorrow's management can be as good as today's managers care to make it," asserted Ralph M. Besse, president of Cleveland Electric Illuminating Co, in presenting his views on securing and training tomorrow's managers.

He said the job of tomorrow's managers will be far more difficult than today, and better people, better trained, will be required.

Besse also said the electric utility industry must begin recruiting the best students from the best colleges.

Developing the optimum management team depends on having a system that allows selection of the best qualified person for a given job, according to Besse, and the old "next in line" practice is not always adequate to move best manager candidates toward the top. Besse said elements of a good "merit selection" include:

- A formal, well-administered system of annual appraisals of merit, performance, and relative ranking of all candidates;
- Adoption of an objective that all vacancies will be filled by people who are better than those being replaced;
- A method of identifying the outstanding candidates;
- Move inadequates out of supervisory positions as soon as inadequacy is demonstrated.

Rising Economy Raises Interest on Construction Money

Financing the electric utility industry's construction program received the attention of a panel that covered the various elements that must be considered.

George W. McKinney Jr, assistant vice president of Irving Trust Co, pointed out that facts now available indicate that the general economy is on a sound upswing, with the result that there are higher demands for credit. He estimated that 1961 financing by large electric companies will total $1.6 billion. Offerings in the third quarter will "be on the light side," and the bulk of the offerings yet to come will be in the fourth quarter.

NICHOLS

SHEPHERD

HUTCHESON

YOUNG

He summarized by saying:

"The short run outlook for the economy, then, is for a strong economic expansion, with an accompanying rise in demand for credit and an upward drift in interest rates."

As offerings increase, the utilities can expect to find investors looking for increasing earnings and dividends, a maximum positive growth factor and a minimum deviation from this trend, and stock will be bid up when management can produce these factors. These are the ideas expressed by Frank D. Chutter, industry specialist for Massachusetts Investors Trust.

Chutter said, "For some reason or another, dividend action is a language which all investors seem to understand perfectly." He cited increased dividends as a means of communicating with the investing public.

"Frankly, gentlemen, I'm here to make a pitch for equity financing and to urge increased efforts to spread stock ownership among even more millions of Americans," said William A. Doyle, financial writer for the *New York World-Telegram & Sun*.

One of his reasons for the statement is that ". . . each stockholder represents at least two votes on the American political scene. As stockholders grow in number, even Mr Udall will have some second thoughts about zeroing in and blasting away at you."

Charles C. Glavin, vice president and director of the First Boston Corp, emphasized the importance of flexibility of **(1)** type of issue, **(2)** timing and **(3)** method of sale, and the place of the investment bankers in helping meet these considerations.

". . . . may have to act with even greater unity"

" . . . utility industry, a big part of 'New Frontier'"

New EEI President, Philip Fleger,

Standing tall and composed there in the spotlight of the Waldorf-Astoria Ballroom in New York, Philip A. Fleger wasted little time with formalities in getting down to the nub of his new job as president of the Edison Electric Institute.

With an economy of words and a direct approach worthy of a practiced trial lawyer, the board chairman of Duquesne Light Co sized up what he considers to be the most pressing problem facing the investor-owned electric utility industry today: "A new and greatly intensified campaign is being launched by the advocates of government power. . . ."

He spelled out the indictment in summary style: "Some people in Washington seem to think that the electric utility industry is a large part of the Administration's 'New Frontier.' They are re-emphasizing the development of wholly unnecessary government power projects. They are discussing plans for an equally unnecessary federal transmission system. They are espousing the most extreme interpretations of the so-called 'preference clause.' And they are encouraging rural electric co-operatives to serve factories and stores and other non-farm customers—contrary to the worthy intent of the Rural Electrification Act."

Fleger then launched his own spirited offensive on behalf of the investor-owned utilities, ticking off the points in their favor: **First,** a record of dependable service; **Second,** a record of keeping prices down in the face of rapidly rising costs; **Third,** a record of building for the future, with capacity always ahead of demand, and a national network of transmission that is available in any emergency.

To those who are even distantly acquainted with Phil Fleger's 35-year career in the utility business, the vigor and incisiveness of his inaugural remarks came as no surprise. He is the law clerk, a graduate of the University of West Virginia, who rose to the position of president of the Philadelphia Co System, of which Duquesne Light was a part. He is the company attorney who turned to management and is recognized as a competent practitioner of that complex specialty as board chairman and president of Duquesne Light.

On the day he took over as EEI president, Fleger found time to sit down with *Electrical World* editors for an interview, which is reported in the adjoining columns.

Q: Could you give us a very brief bit of your personal philosophy as regards the electric utility business?

A: I believe our primary mission is to provide the best and most economical service in the world to the people in this country. All of our other tasks are related to this single mission.

Q: What do you see as the most pressing problem facing the utility industry?

A: As my acceptance remarks point out, I believe one of the most pressing problems is the new, and greatly intensified, campaign which is being waged by government power advocates in Washington this year. This covers just about all fronts—proposed federal generation projects, a planned federal transmission grid, developments in federal rural electrification, and extreme interpretations of the "preference clause."

Q: The Administration's proposal to install some 700 Mw of electrical generating capacity in the New Production Reactor at Hanford, Wash., appears to be gaining ground. What are your views on that proposal?

A: The EEI views on that were summed up in a letter submitted to the Joint Atomic Energy Committee. We oppose generating facilities at Hanford because we believe they would make no contribution to the advancement of nuclear power technology; because we believe the federal government has no responsibility to own and operate thermal power plants, and because power generating facilities for that area could be financed in a free market.

Q: Along that line, we hear talk in Washington that the Administration and some members of Congress are not fully satisfied with the rate of development of nuclear power plants. What role should the government play in such development?

A: It has been and is our belief that the government should help in the area of basic research and development of nuclear power plants and look to investor industry to build and operate the large-scale plants.

I might say in connection with all these government proposals for power facilities that the most un-American thing going on today is the government's use of tax and other unfair advantages to compete with the businesses of its own citizens.

Q: We can't help but notice that other industries

". . . working on broad-gage transmission plans . . ."

". . . lawyers . . . work in almost every phase . . ."

Scores Government Power Drive

are much quicker to respond to verbal attacks than is the electric utility industry. Is there any way that the investor-owned electric utilities can meet these attacks more vigorously and more swiftly?

A: You must remember that some other industries are smaller and more susceptible to domination by very few companies. They may have fewer geographical differences. There are some valid reasons for our more deliberate response to charges leveled at our industry, but as I point out in my acceptance remarks, "we may have to act with even greater unity and with even greater awareness of national problems affecting us than we have in the past."

Q: There seems to be a reluctance on the part of some investor-owned utilities to move along on interconnections mainly because this would mean crossing state lines and bring them under federal regulation. Do you think that this is a valid reason for holding back interconnections?

A: There may be some special cases, but I would think this would be the exception. As has been pointed out, there is already considerable pooling and extensive interconnections among investor-owned utilities.

Q: Are you aware of increased interest on the part of investor-owned utilities for expansion of interconnections and pooling?

A: There is no doubt that more companies are working on broad-gage transmission plans now. We want to take advantage of opportunities provided by interties. One strong bit of evidence along that line is the part utilities are playing in various extra-high-voltage transmission research projects.

Q: Harking back to your statement of the industry's mission of "the best and most economical service," just where does research fit into that mission?

A: The industry is fully conscious of the relatively heavy fixed plant investment in utility operations, and it realizes that the ability to accomplish its primary mission depends on research done by manufacturers and utilities to improve equipment and operations.

The main role that EEI will play will be to coordinate and supplement the research being done by individual utility companies and groups of companies.

Q: You mentioned research by manufacturers and research by utilities. Do you think there is a fair understanding as to just what part each will play?

A: Generally the manufacturers will stick to product research, and the utilities will stick to applied research. There remains a good deal of confusion as to this distinction, but we have some reasons for moving along these lines. In the first place, manufacturers naturally have people who have well-grounded experience in product research. The same is true of utilities as regards applied research. The manufacturers have incentive to continue product research from a strictly business standpoint. There is the further consideration that manufacturers conduct an unregulated business, while utilities are regulated. In our study which led to creation of the EEI research activity, manufacturers indicated to us that they are currently spending in the neighborhood of $200 million annually on research for the electric utility industry alone.

Q: It is a lot easier to get information on manufacturers' research activities than on utility activities. What is the reason for that?

A: It should be the other way 'round. Utilities, generally speaking, do not compete with one another in the same sense that manufacturers do. Utilities could profit by the dissemination of this information among themselves and among their customers. This is mainly a problem of communication. Some of the reports are too technical to be of wide interest. We will have to work to make them more easily available in language that is understandable.

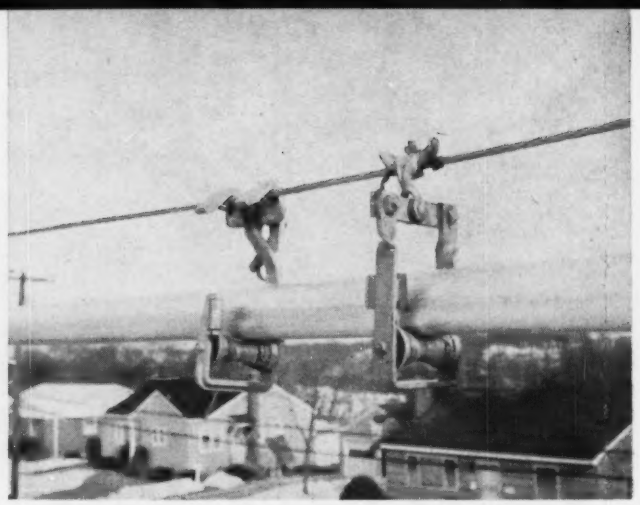
Q: Do you think utilities are getting unfavorable publicity as a consequence of the antitrust cases brought against electrical manufacturers?

A: I don't think so. But the utilities are concerned, and some 150 companies have formed a lawyers' group to conduct studies and try to determine what equipment prices would have been if agreements had not existed among manufacturers. We expect a report soon.

Q: One last question. Do you have any explanation as to why so many lawyers have moved up to top utility positions?

A: It may be because, our business being a regulated one, lawyers have occasion to work in almost every phase of our industry.

CABLE PULLING required the equipment and rigging shown above in order to safeguard the not very flexible cable



STANDARD BLOCK (left) is supported by company-contrived block at right which was made from stock materials

Aluminum-Sheath Aerial Cable

Selected over open wire and pipe-type cable on LILCO transmission line having overhead and underground sections

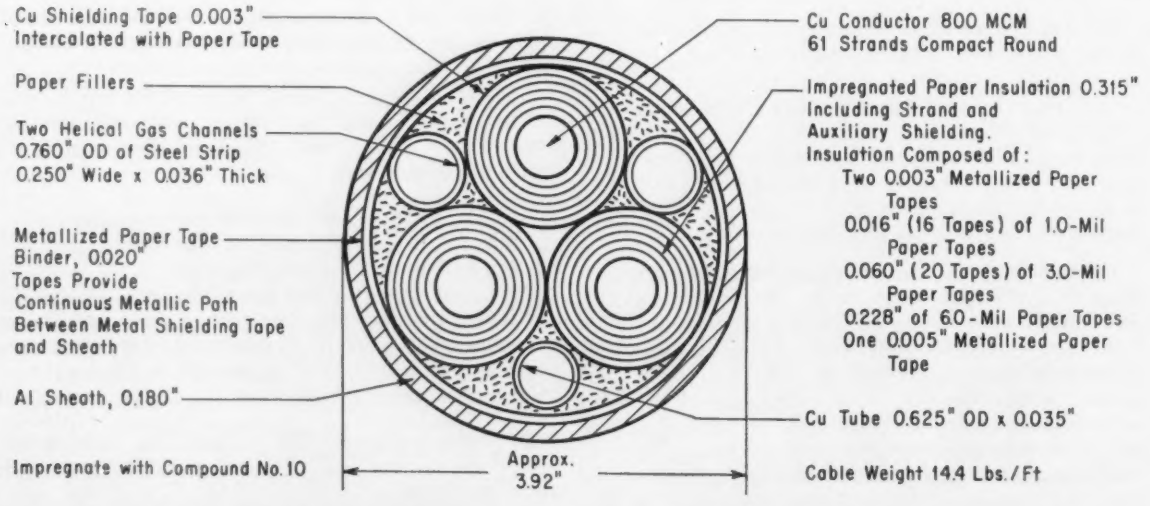
ELMER DeTURK, Manager, Electrical Engineering Department,
FRED J. BENDER, Engineer, Long Island Lighting Co, Hicksville, N.Y.

A 69-kv aerial cable is now being pioneered on the Long Island Lighting Co system in an area where building a new line posed a dilemma. Conventional overhead construction would have aroused neighborhood protests. A pipe-type underground cable would have been too expensive.

The new construction, which LILCO believes to be the first of its kind, only became feasible with the advent of aluminum sheath strong enough to withstand high internal gas pressures.

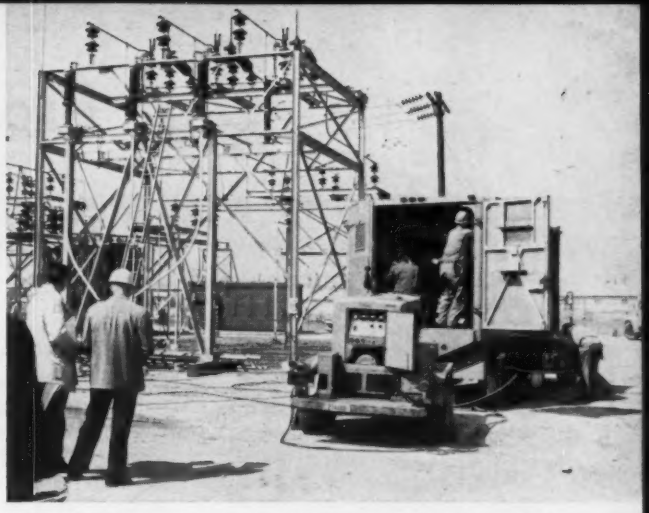
LILCO's present estimates are that aerial cable construction costs about three times as much as conventional open-wire construction and about half as much as underground pipe-type cable of equivalent capacity. The project is watched by the industry with much interest with regard to final costs, performance, and general acceptance. To date this aerial cable shows considerable promise of being a practical compromise between underground and overhead construction.

The new line follows a heavily


Cu Shielding Tape 0.003" Intercalated with Paper Tape
Paper Fillers
Two Helical Gas Channels 0.760" OD of Steel Strip 0.250" Wide x 0.036" Thick
Metallized Paper Tape Binder, 0.020" Tapes Provide Continuous Metallic Path Between Metal Shielding Tape and Sheath
Al Sheath, 0.180"
Impregnate with Compound No. 10
Cu Conductor 800 MCM 61 Strands Compact Round
Impregnated Paper Insulation 0.315" Including Strand and Auxiliary Shielding. Insulation Composed of:
Two 0.003" Metallized Paper Tapes
0.016" (16 Tapes) of 1.0-Mil Paper Tapes
0.060" (20 Tapes) of 3.0-Mil Paper Tapes
0.228" of 6.0-Mil Paper Tapes
One 0.005" Metallized Paper Tape
Cu Tube 0.625" OD x 0.035"
Cable Weight 14.4 Lbs./Ft
Approx. 3.92"

CROSS SECTION shows the three-conductor, 800-MCM, 69-kv, high-pressure, gas-filled cable. The aluminum sheath withstands nitrogen pressure of 200 psi. There are three gas passages in the insulation's interstices

PORTABLE SHELTER was used by cable-splicing crews to expedite construction during the inclement weather



TEST CREW is seen at work at Plainview Substation, where one end of the line terminates on the substation's structure

Is Pioneered on 69-Kv Line

traveled suburban road, typical of those in today's residential areas with its mixture of commercial centers, schools, and gas stations. Overhead, it resembles the telephone facilities with which its shares the poles.

The south terminal is a distribution substation, where the cables provide a feed. The north end connects to an open-wire line which is part of LILCO's 69-kv network.

Conforming with the southern substation's arrangement and surroundings, the connection was brought in underground. The north end crosses a State parkway and expressway, where underground construction had to be resorted to also.

Underground sections employ the same cable, but have an additional polyethylene jacket for corrosion protection. Both underground sections were installed in direct-buried fashion.

The cable is three-conductor, 800-MCM copper, with 0.315-in. paper insulation in an 180-mil-thick aluminum sheath. There are three gas passages in the insulation's interstices: one, a solid-wall copper tube; and, the other two, open steel helices. This self-contained system operates at a nominal 200-psi nitrogen pressure. Cable diameter is 3.92 in.

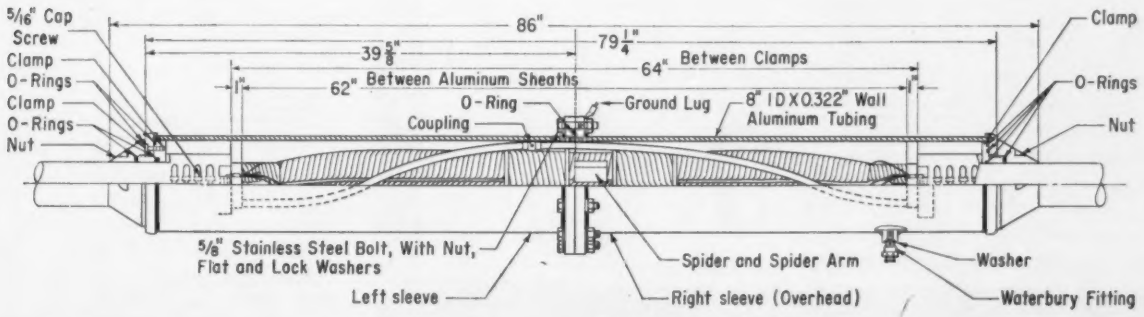
The project, as a whole, comprises 10,000 ft of aerial and 3,000 ft of buried construction. Individual sectional lengths are 1,000 ft or shorter, this dimension being established by the maximum length of aluminum tubing that can be shipped and handled. There are 16 mechanical-type joints, whose enclosing sleeves are 7 ft long and 8½ in. dia. Each sleeve is in two pieces bolted together at a middle flange which has an outside diameter of 12 in.

Joints in the underground sections are direct-buried and have a combination of epoxy and tape corrosion wrapping, all in a redwood box filled with wax.

Most of the aerial portion was spun directly on a seven-strand, 20,000-lb-ultimate-strength Alumoweld messenger, but several spans were attached to the messenger with preformed lashing rods on an experimental basis.

Because of the cable's rigidity and/or weight, the conventional erection method of spacing standard aluminum messenger blocks in sufficient numbers to support the cable's weight proved, during cable

(*Continued on page* 134)



SPLICE CHAMBER is 7 ft long, 8½ in. in diameter, each sleeve being in two pieces that are bolted together at a middle flange. There are 16 mechanical joints, those underground requiring additional protection against corrosion

Data Processing System Cuts

Distribution transformer inventories were reduced by $296,206 in first quarter of operation, with a goal of a $500,000 reduction. And paper work has been cut by 60 percent

P. D. HUFF, Manager, Distribution Engineering and Operations,

MRS. J. H. SHAW, Engineering Clerk, Duke Power Co, Charlotte, N.C.

Duke Power Co has put its distribution transformer stocking on an automatic basis. It uses data processing equipment to maintain a weekly check on stocks and requirements at 31 locations and to initiate the necessary action to replenish supplies, also on a weekly schedule. Objectives of the program are to:

1. Have transformers where they are needed and when they are needed.
2. Reduce system-wide excess stocks to a minimum.
3. Reduce paper work.

The program was initiated Jan 1, 1961, and in the first quarter of operation transformer stocks were reduced by $296,206. New transformer orders for the first quarter of 1961 were only half of what they were for the same period in 1960.

It is estimated that paper work has been reduced by 60%. And the most important objective, having transformers where needed when needed, has been attained. Indications are that transformer stocks may, in time, be reduced as much as $500,000.

The procedure of maintaining transformer stocks has also eliminated a large number of telephone calls, letters and other contacts concerning transformers on order and not received. It has placed virtually all of the work connected with maintenance of transformer stocks in the hands of clerks and the data processing system.

The procedure will automatically mesh the ordering and delivery of distribution transformers into changing conditions throughout the system.

The program automatically considers the weather and scheduling of work of local districts to the extent that if work assignments require no transformers, the district will receive none. It will also automatically take into account construction requirements which go hand in hand with business conditions. It will elimi-

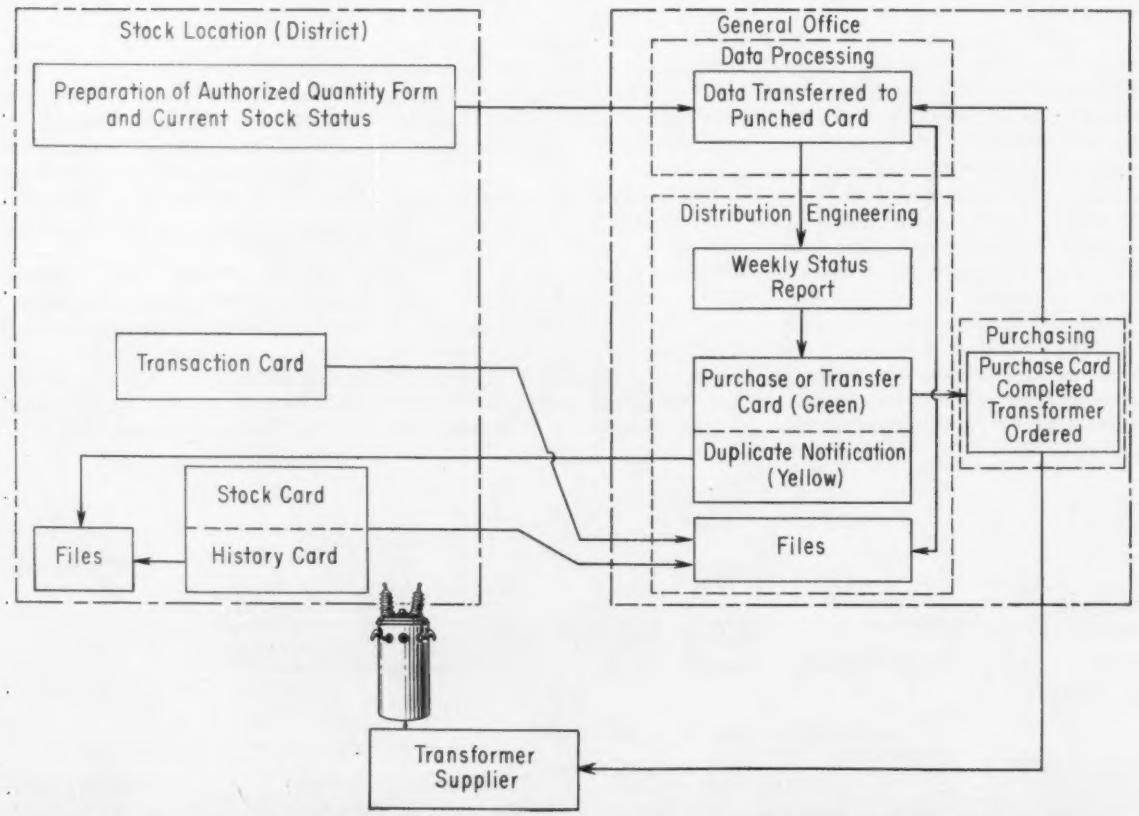


FIG. 1—AUTOMATIC STOCKING SYSTEM provides for maximum transfer of information with minimum amount of paper work. Virtually all transformer ordering is now placed in the hands of clerks and the data processing system

Transformer Stocks

nate requisitions for transformers and the inherent paper work delays at all levels and will provide pertinent information for management, distribution engineering, system planning, and FPC reports and budgets.

This program required complete revamping of the methods of maintaining transformer stocks. The first step was the compilation of data and specifications and issuing of a new distribution transformer manual. Manuals have been supplied to the districts, central control, the purchasing department, the distribution engineering department and transformer manufacturers.

Key to the manual is the series of DT (Distribution Transformer) numbers that are assigned to all distribution transformers on the system, regardless of age, voltage or size.

Each page in the manual shows all pertinent data, such as primary and secondary voltages, on transformers coming under that particular DT number. There have been 187 DT numbers assigned. These numbers cover 775 kva ratings, so that while a DT number covers only one combination of voltages, it may cover more than one kva rating.

Price Data Included

Price data are included in the manual. When prices or specifications are changed new pages are issued. The manual was issued on Nov 1, 1960, so that personnel could study specifications and coding in advance of conversion to the new system on Jan 1 of this year.

Since 90% of Duke's purchases are limited to two voltages and five sizes, only those have been set up on the Automatic Replenishment Program. These are:

DT 30 25 kva—2,400/4,160-v wye —120/240-v single-phase

DT 30 50 kva—2,400/4,160-v wye —120/240-v single-phase

DT 114 10 kva—12,470-v wye/ 7,200-v—120/240-v single-phase

DT 114 25 kva—12,470-v wye/ 7,200-v—120/240-v single-phase

DT 114 50 kva—12,470-v wye/ 7,200-v—120/240-v single-phase

The automatic replenishment program is operated with three types of

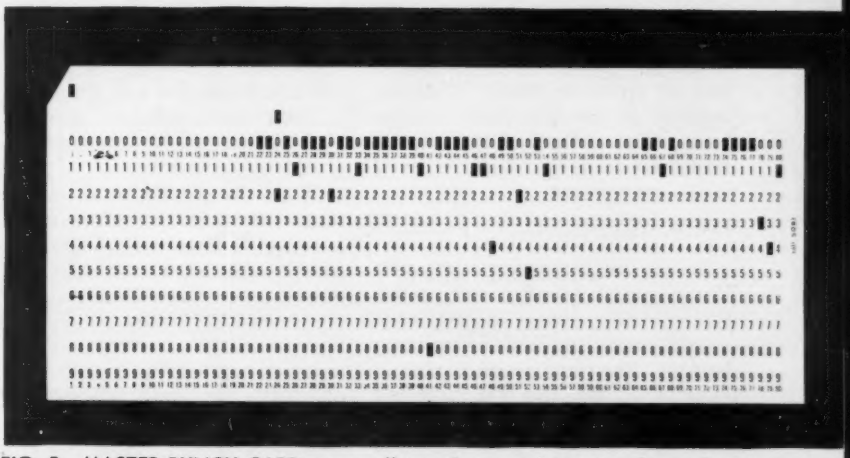


FIG. 2—**MASTER PUNCH CARD** stores all transformer information for each DT number at each location. There have been 187 DT numbers assigned to date

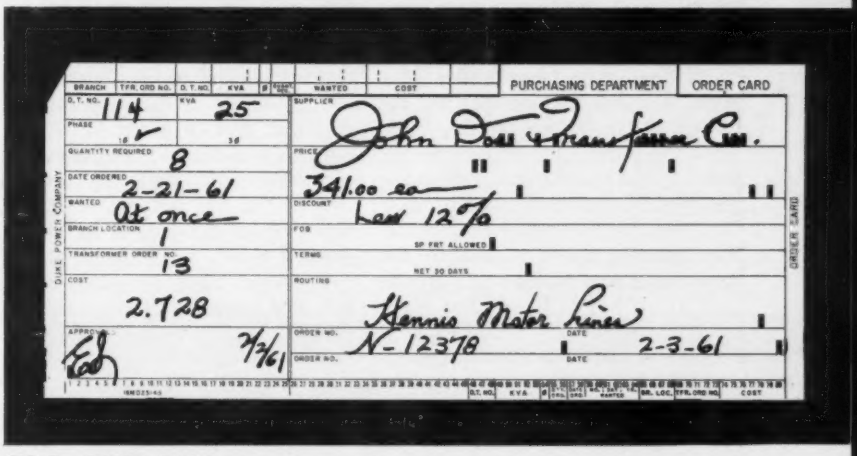


FIG 3—**ORDER CARD,** green in color, is sent by distribution engineering to the purchasing department with the part to the left of the double lines filled out

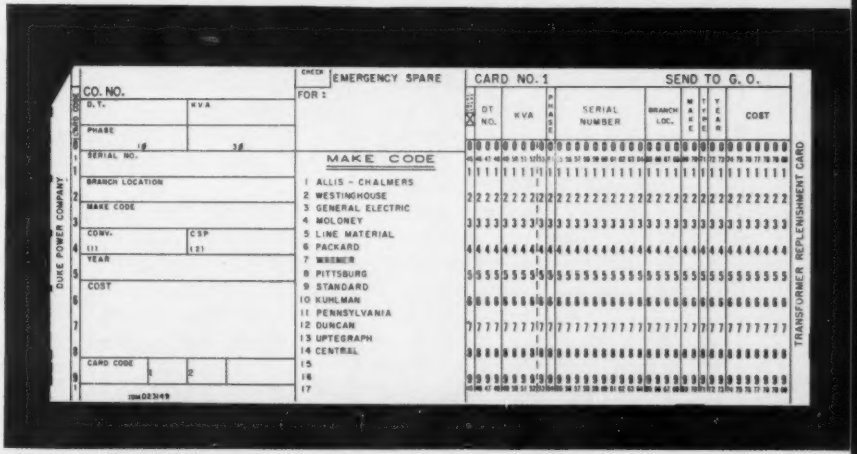


FIG 4—**STOCK CARD,** or No. 1 card, is filled in at stocking location when the transformers on order have been received from the transformer supplier

punched cards with nine codes and one form. Equipment required is one sorter, one calculator, one collator and one accounting machine.

An authorized quantity of transformers for each DT number and size at each of 31 stocking locations was set up at the district level and reported on an authorized quantity form. The authorized quantity information from this form is stored in the master card.

Further Uses Studied

As the program progresses, trends in uses will be studied and needed changes will be made in authorized quantities for the various stocking points. The authorized stocking quantity in the five DT numbers covered on the automatic replenishment program is maintained automatically by the distribution engineering department on a weekly basis.

When the weekly report, which is prepared on an accounting machine, shows that more transformers of a given size and DT number are required at the various stocking locations the order card code 9 is initiated by the transformer clerk in the distribution engineering department. This card is prepared in duplicate. The green original is sent to the purchasing department with only the part to the left of the double vertical line filled out. The duplicate is identical except that it is yellow. It is mailed to the branch with a note attached which reads:

> Enclosed are the yellow duplicate order cards covering distribution transformers ordered for your branch on the Automatic Replenishment Program. These cards will give you information as to transformers you are to receive.

When the purchasing department places the order the green card is returned to distribution engineering with information to the right of the double vertical lines filled in, including the purchase order number. The card is then sent to the data processing department where the data is punched in the card and processed for the annual report. The card is then filed by the distribution engineering department.

Field orders for all other voltages and sizes are originated in the district on the duplicate form of Fig 3. These orders are mailed to distribution engineering where they are processed in the same manner as those that originate in the department under the automatic replenishment program. In this case the district fills out the portion of the form to the left of the double vertical lines.

All order cards are edited by distribution engineering where they are checked for errors. At the same time stocks available at other locations are checked from the records and the weekly IBM reports. If one stocking location has an excess of the type being ordered by another stocking location, or if there is an old type available that will serve the purpose, the orders are made up for a transfer instead of purchase of a new unit.

Stock Card Filled Out

When transformers are received at a stocking location, a stock card, or receipt card, known as a No. 1 Card, Fig 4, is filled out. A separate card is made up for each transformer. This card is white and is a carbon-in-leaf, snap-away type.

All pertinent information is filled in on the left side of the card and it is sent to the general office. The history card is the second part, or carbon, of the stock card shown in Fig 4. The history card is filled out on both sides and is retained in the district as a stock card. It stays in the file of stock cards until the transformer is placed in service. This type record at each stocking location has reduced many odd files and in general has brought about standardization of these records throughout the company.

Both the stock card and the history card carry nine code numbers in the first column at the left. All new units received are Code 1.

Location	Code 1	Code 2	Code 3	Code 4	Code 5	Code 6	Code 7	Code 8	Kva Rec'd	Kva Transf.	Kva Retired	Kva Net Gain
1	53	7	51	265	14	20	61	352	31,850	29,275	1,205	21,720
2	58	4	3	106	11	2	46	211	24,850	20,280	460	13,330
3	76	20	18	42	34		16	235	34,225	12,375	1,685	32,015
4	57	40		50	31	5		114	14,350		2,220	10,945
5	15	4	1	20			2	34	3,600	1,050		3,555
6	4			13				26	400			2,155
9	65	3	4	56	39		4	155	17,800	3,750	2,925	25,280
10	2	4		22			20	41	6,150	2,650		3,695
11	20		1	74	51	7	13	128	4,650	2,100	1,875	10,430
12	4	1	1	13			3	26	800	1,125		875
13	39	1	6	50	63	8	13	121	7,250	5,200	3,945	9,830
14	21	4	5	26		4		82	12,850			16,750
15	9	3	1	25	1		12	40	4,250	1,200	100	1,770
16	23	28		16	19	5		44	7,300		1,100	4,250
17	15	17		24			2	39	3,500	750		3,160
18	7		2	3	26	2	8	8	1,650	1,900	1,595	1,250
21	17	25	1	26	4		2	72	7,975	4,500	880	10,485
25	1								100			
27	2			9			4	19	350	400		4,990
28	9	18		27	12	1	1	40	10,025	1,500	2,260	8,820
29	1		5	20	12			27	100		835	180
44	9		2	25	37			29	2,750		1,355	4,310
51	8	6		18			5	25	6,000	250		7,305
58	11	3		23	1		1	31	2,750	50	150	2,195
60	3			58	15	5	4	129	450	4,500	1,050	20,355
65	15	5	4	56	2	4		70	6,750		60	1,650
72	20			10	1	2		17	2,600		30	1,210
79	6	9		19	14	13	1	49	7,500	50	610	5,345
80			3	11			2	19		750		1,250
88	6	1		4			6	10	1,650	600		3,490

FIG 7—**MONTHLY SUMMARY** is prepared by distribution engineering department with figures listed by location number

All transferred units received are Code 2. The same procedure is followed for both of these codes.

Emergency spares are checked in the space shown, top center, with an X punch in the card and are identified on the monthly report by an asterisk. These cards are edited by the distribution engineering department and sent to data processing to be punched and stored for later reports.

Codes 1 and 2 tell the data processing department to add to the stock.

All cards are written with a ball point pen and mailed to the general office distribution engineering department in a plastic envelope, which is shuttled back to the branches.

The third and last card is the transaction card. It is salmon in color and is sometimes referred to as the movement card. This card covers six codes, numbers 3 to 8 inclusive. Codes 3 and 4 add to stock and Codes 5, 6, 7 and 8 reduce the stock.

Code Number Indicated

The code number is indicated by filling in the proper space for it on the left hand side at the bottom of the card. The significance of each code number is indicated in the center of the card.

The left hand portion of this card is filled in from data taken from the history card with the code number designation at the bottom indicating the transaction that is taking place. The card is then mailed to the general office distribution engineering department.

When the transaction card is filled out the district also notes the transaction on the history card and files the history card in the appropriate file.

This requires daily working since the operation is being maintained on a 14-day schedule.

All cards are retained until the end of the month when they are sorted and summarized into one basic summary for all locations, with the figures indicated on the summary by location number. Transactions are indicated in the report by code number.

Code No. 9 covers new purchases and these will be included in the summarized report only once every six months or perhaps on an annual basis, depending upon requirements as indicated by experience.

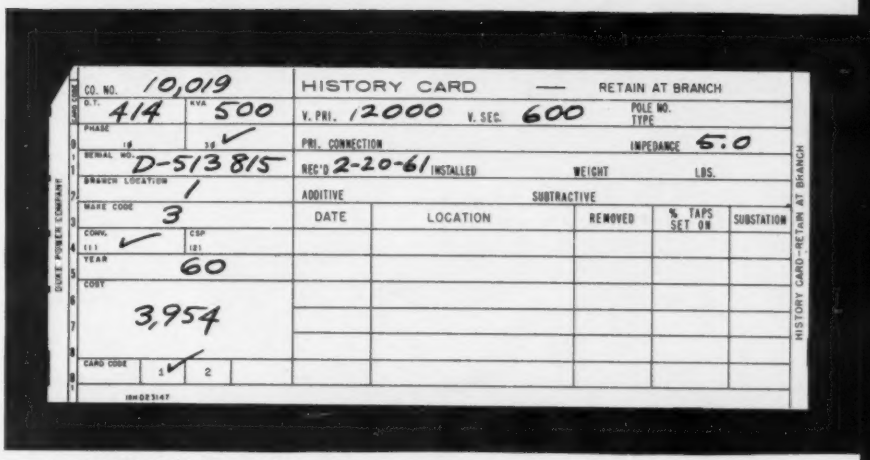


FIG 5—HISTORY CARD is carbon of Stock Card, Fig 4. It is retained at stocking location as a stock card. Fig 4 card is returned to distribution engineering

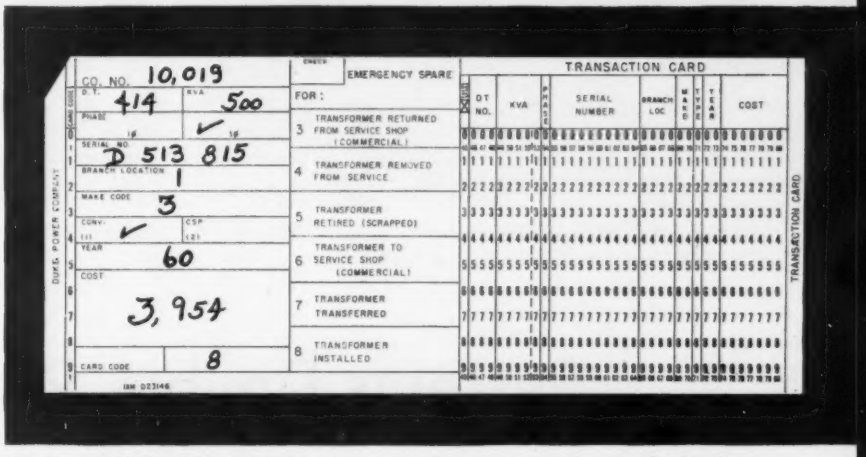


FIG 6—TRANSACTION CARD is salmon in color and is used to notify the distribution engineering department of changes in status of transformers

All cards are merged for a monthly report which is prepared by the machines. Two copies of this are mailed to the district and two are retained by distribution engineering so that both groups can check the report and study the inventory.

Several factors influenced the selection of the weekly cycle for preparing reports on inventory and the general operation of the program:

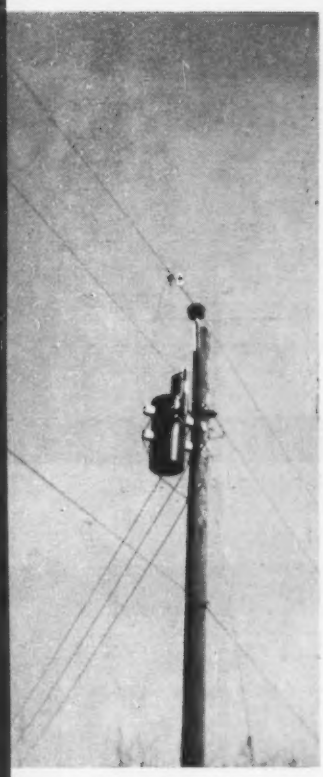
1. The weekly cycle required a smaller inventory than would be required with a monthly cycle.

2. Duke Power's truck fleet makes its visits to the stocking locations on a prearranged schedule.

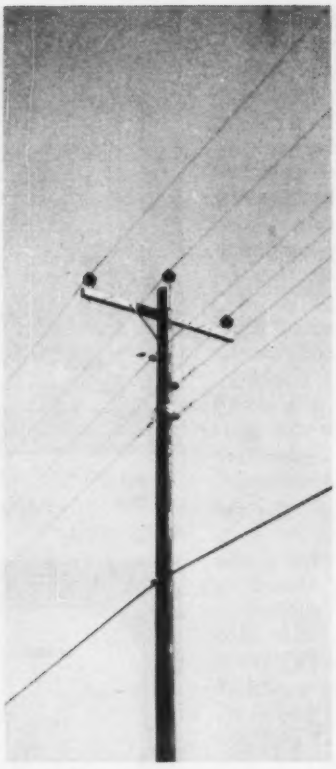
3. Transformers are shipped from manufacturers' local stocks, making possible prompt replenishment.

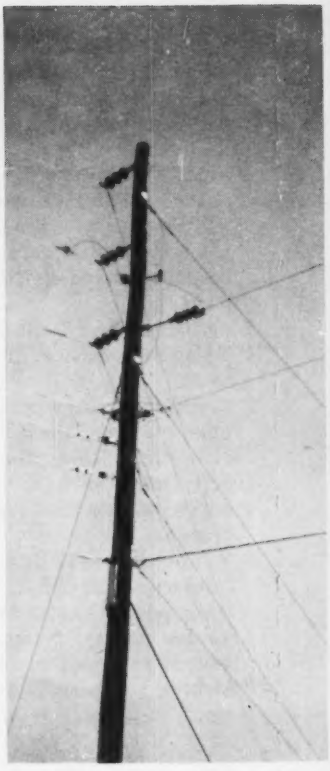
A large cut in paper work has been made. A reduction in typing and clerical work was made possible because long descriptive material is available to all concerned: manufacturers, purchasing department, engineering department, and the district by referring to the transformer manual. There is the same reduction in paper work in the preparation of invoices, and requisitions are eliminated by the card in Fig 3.

At the end of the first quarter of operation the rough spots had been worked out of the program and personnel at all levels enjoyed the new procedure. The system may open new doors to savings through the control of stocks and inventories of meters, poles, street lights, conductors and other items.



DISTRIBUTION TRANSFORMERS will be replaced by **AUTO-TRANSFORMERS** (right) stepping up segment voltage





CROSSARMS (left) will not be replaced, nor will the **VERTICAL DEADENDS'** conductor spacing remain

Systems Double Primary Voltage

Two Tennessee co-ops to boost distribution primaries to 14.4/24.9 kv for loads expected over the next 20 years

WILLIAM M. WILSON, Consulting Engineer, Nashville, Tenn.

Boosting primary distribution from 7.2/12.45 to 14.4/24.9 kv proved in studies to be the most economical way of increasing system capacities of two Tennessee cooperatives. This conclusion was based on load-growth and system analyses to determine long-term capacity needs.

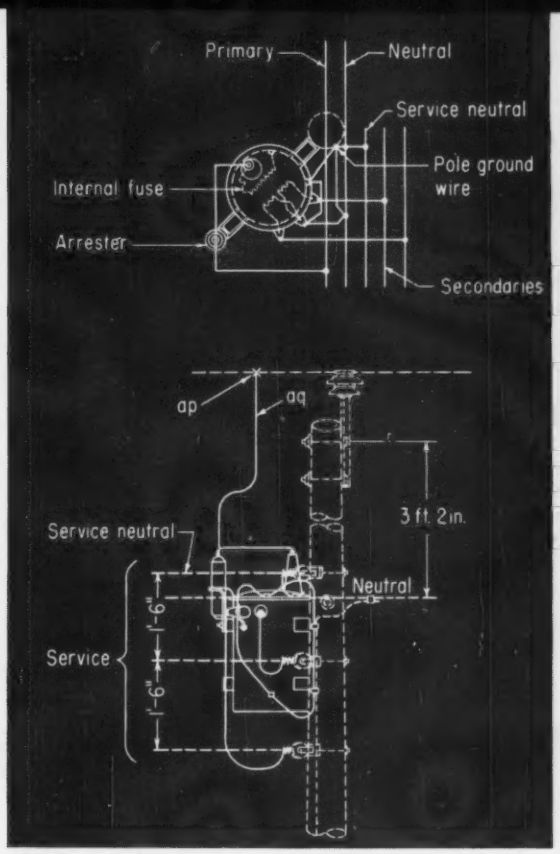
Few overhead circuits actually are limited by their thermal capacities. Doubling voltage, therefore, provides about four times the original system capacity. Operating at the higher voltage, the system is also enabled to service large motor loads without a primary voltage flicker likely to draw customers' complaints.

Studies indicated that capacity was needed for loads that could be expected 20 years hence on the systems of the Middle Tennessee Electric Membership Corp and the Caney Fork Electric Cooperative. The former has 20,000 customers, 3,500 miles of line, a peak demand of 85,000 kw, and an annual load factor of 39%; the latter, 10,400 customers, 1,700 miles of line, a 24,800-kw peak demand, and an annual load factor of 39%.

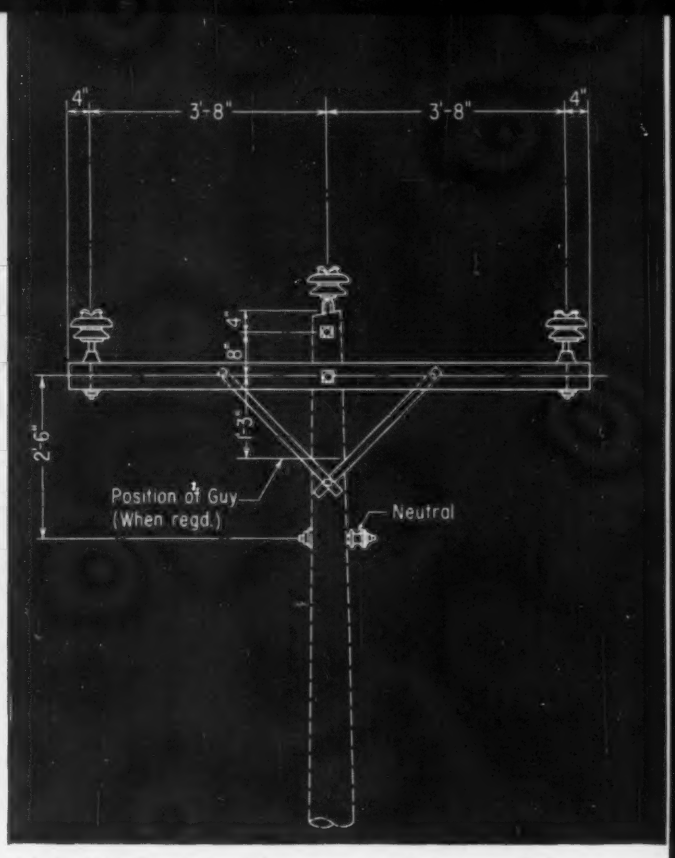
As a first step, other systems which had converted to the higher voltage were studied. The two co-ops pursued their own studies on the basis of reports of favorable conversion costs and operating gains. The cardinal factor in the economics of such conversion is the relative cost of equipment for the old and new voltage, and the operator's ability to change step by step as new increments of capacity are required. With just a few exceptions, materials and equipment were standard and available.

Step-by-step conversion to 14.4/24.9-kv operation will be accomplished by installing autotransformers to boost voltage on taps as load conditions call for higher voltage. The change from 7.2 to 14.4-kv transformers for customer service will be handled in easy stages. When the taps cut over to the higher voltage reach a critical number, the feeder itself will be changed to the higher voltage. The autotransformers will then be moved to where they will step the voltage down on taps to customer transformers not yet changed to the higher voltage.

On other systems dual-voltage transformers for serving customers have proved both economical and convenient. Although slightly more



POLE for single-phase line will have transformer at 45-deg angle to clear climbing space, shorten risers



MORE PHASES call for 8-ft crossarm at bottom pin bolt and angles of 5 to 30 deg will have 10-ft double arms

to Gain Capacity

costly than standard units, dual-voltage transformers, it is fairly certain, will be used in the conversion of the two Tennessee co-ops.

In the conversion procedure, the use of autotransformers presents advantages over conventional, two-winding transformers. Having a transformation ratio of 2:1, they are about half the size and weight of two-winding units of equal capacity. Furthermore, they cost less. Yet the 3-phase autotransformer, connected wye-wye, has these drawbacks:

1. Equipment relaying back of the installation is made more difficult by the distribution of fault currents.

2. Unstable voltages may prevail during fault conditions because of the shifted neutral point.

3. Harmonics may interfere with communications circuits.

But these possibilities have been overemphasized. In fact, there is at least one instance of telephone interference reduced by stepping up line voltage through autotransformer banks. This is accounted for, not by the autotransformers themselves, but by the lessening of exciting currents in the distribution transformers at the higher voltage.

The wye-wye arrangement enables the autotransformers to step the voltage both up and down. Were a bank delta connected on either side, it would need a grounding bank, a source of problems in itself, and the transformer could not be used in the single-phase lines.

As the autotransformers will be relocated from time to time in the conversion process, their specifications were developed to provide versatile units with good operating characteristics. For supplying either single or 3-phase service, single-phase units of about 200 kva will be used generally. But on one system at least, it now appears that 3-phase units of 3,000 kva each will, probably, be installed.

Line designs for the new 14.4/24.9-kv systems will follow REA standards or the principles established in REA standards. Conductor spacings will remain unchanged. Although code requirements specify 2 ft more ground clearance for 14.4/24.9-kv circuits, phase-conductor clearance in most places exceeds the 7.2/12.45-kv requirement. Pins and insulators will be changed, but poles and crossarms, except a few, will stay.

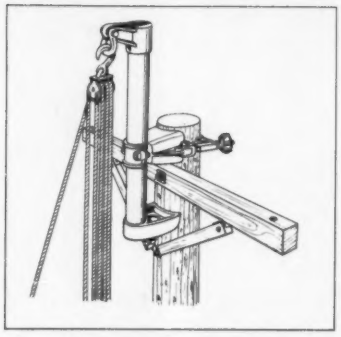
The 14.4-kv transformers will have a 125-kv BIL and will be protected by 18-kv arresters. Transformer losses will be slightly higher than those of 7.2-kv units, but line losses, less. The difference in regulation is not considered significant.

Experience with lightning damage to poles on earlier rural lines prompted the designers to specify the installation of arcing horns be-

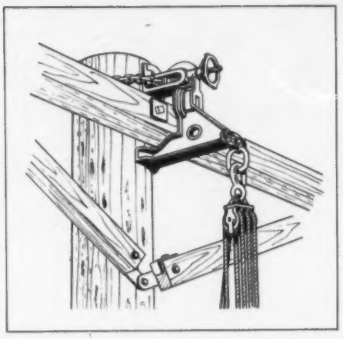
(*Continued on page* 134)

ELECTRIC UTILITY METHODS

CONSTRUCTION & MAINTENANCE



FIBERGLAS GIN (DESIGN a) Physical properties: Weight, 21 lb; height, 31 in.; capacity, 1,000 lb; 11 in. between shackle and pole. Light-weight; easily rigged by one man; high dielectric strength; requires minimum pull-out; can hang direct pole-mounted transformers 1,000 lb and less 26 in. below first gain on two types of construction



2-IN-1 PARTIAL GIN (DESIGN b) Physical properties: Weight, 14 lb; height, 18 in.; capacity, 1,200 lb; material, bronze; distance between shackle and pole, 11 in. General information: This gin, part of a 2-in-1 complete gin, may be used independently for certain applications; normally installed inverted from its position with complete gin assembly

Proper Pole-Top Gin for the Job

C. E. MILTENBERGER, Supervising Engineer, T&D Work Practices, and
W. S. WAECKERLE, Engineer, Union Electric Co, St. Louis, Mo.

GIN SELECTION CHART
FOR HANGING AND REMOVING
TRANSFORMERS

Code	Gin	Capacity (Lbs.)
a	Fibreglass	1000
b	2 in 1 (Partial)	1200
c	2 in 1 (Complete)	1200
d	Pole	2500
e	Steel	7500

Standard Number	Transformer Weight Range (Lbs.) 0–1000	1000–1200	1200–2500	2500–7500
1.1.13.8 .5	abcde	bcde	de	-
.6	abcde	bcde	de	e
.7	abde	bde	de	e
.8	-	-	de	e
.9	bde	bde	-	-
1.1.13.10.1	ad	-	-	-
.2	cd	-	-	-
.3	bcde	bcde	de	-
.9	d	-	-	-
.10	bd	-	-	-
.12	bd	-	-	-
.13	abde	bde	de	-
.15	ad	d	e	-

TO USE THE TABLE, assume a type of construction (standard number) 1.1.13.10.1 and an 800-lb transformer to be lifted up the pole. Select the column under transformer weight range 0-1,000, and run down to the type of construction. Gins suitable for use are designs "a" or "d". As design "a" is listed first, it is the one to use if available. Otherwise design "d" should be used

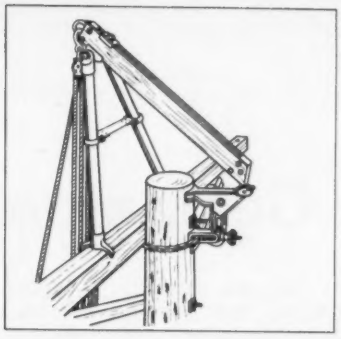
Development of a standard work practice covering the selection and use of pole-top gins has achieved these objectives for Union Electric Co and its line crews:

- Number of different gins carried in stock and on line crew trucks has been reduced to a practical minimum.
- Field forces are aided in the selection and proper use of the right gin for the particular job.
- Maximum safety in the use of gins is assured through standardization of gin nomenclature, capacities and identification.

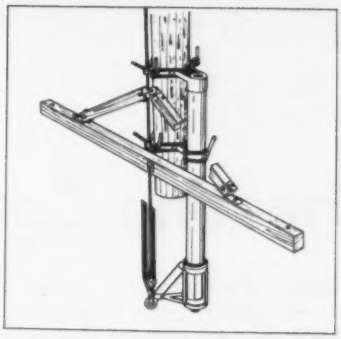
The standard work practice for gins grew from a desire to eliminate insofar as possible a variety of practices, among and within districts, in the use of gins for hanging transformers and other heavy equipment at pole top. As part of a program started in 1959, the standard work practice for gins was developed. Through this work, nine different gin designs in use on the system at that time have been reduced to five basic standard gins. These are capable of hanging transformers according to the 38 different distribution construction standards which may be encountered, and also serve for other equipment.

The standard work practice consists of an identification chart and a selection chart followed by detailed step-by-step description, liberally illustrated by line drawings, to instruct in the proper installation of each of the five different gin designs.

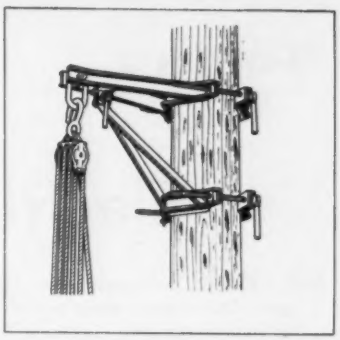
Need for the selection chart arose because each of the five designs has its limitations, both in maximum lifting capability and the type of construction for which it is suited. These limits overlap in many cases so that more than one design can be used for the same job. At this point, variations in ease of



2-IN-1 COMPLETE GIN (DESIGN c) Physical properties: Weight, 50 lb (bronze casting, 14 lb; wood part, 36 lb); height, 48 in.; capacity, 1,200 lb; distance between shackle and pole, 17 in. This is one of two designs that has enough capacity to lift a transformer on an arm in the first gain— requires a crossarm mounted on the pole in the first gain



POLE GIN (DESIGN d) Physical properties: Weight, 73 lb, total all parts; height, 5 ft, 6 in.; capacity, 2,500 lb (preferred method); up to 17 in. between shackle and pole. Made of laminated wood and steel, it affords more lifting height than other gins but seldom is required for transformer work except where additional lifting height is needed



STEEL GIN (Design e) Physical properties: Weight, 40 lb (top section, 24 lb; bottom, 16 lb); height, 18 in.; capacity, 7,500 lb; distance between shackle and pole, 13 in. This gin is made of steel, an electrical conductor. It has the greatest capacity of any of the five designs. This being so, it can place the greatest strain on the pole structure

Pays Dividends

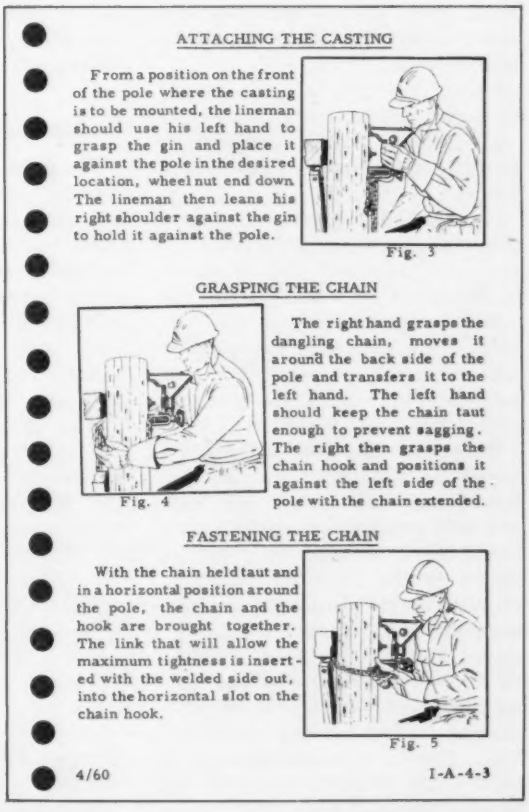
handling and installing each design are given consideration in the chart.

First choice on the chart is always given the gin most capable of doing the job, and which is easiest to install. Choices of other designs are given because it is impractical to permanently equip all trucks with all five gin designs. Therefore, it may be necessary at times to do a job using a second or third choice gin from the standpoint of installation ease.

A gin identification chart in the work practice serves to identify the gins by code letters (a to e) and to standardize on the short identifying name assigned to each different design, i.e., Fiberglas, 2-in-1 partial, 2-in-1 complete, pole, and steel. This chart pictures each gin installed, with its name and code letter.

A portion of the gin selection chart in the work practice is reproduced to illustrate its application. There are three steps in selecting a gin design from the chart. First, go to the column headed by the transformer's weight obtained from its nameplate. Second, run down this column to the row indicating the type of construction (standard number) for the job. Third, find the gin designs listed by code letter, in order of preference, which are capable of doing the job. Where the standard number includes a restriction in transformer weight for that type of construction, no gin codes appear.

These charts are followed by a detailed description of the applications, limitations, and installation techniques for each of the five standard gins. This description tells by words and illustrates by drawings each step the lineman goes through to properly raise the gin up the pole, and to position and assemble it for use. One sheet from the detailed description for the 2-in-1 complete gin is shown here as a typical example.



ATTACHING THE CASTING

From a position on the front of the pole where the casting is to be mounted, the lineman should use his left hand to grasp the gin and place it against the pole in the desired location, wheel nut end down. The lineman then leans his right shoulder against the gin to hold it against the pole.

Fig. 3

GRASPING THE CHAIN

The right hand grasps the dangling chain, moves it around the back side of the pole and transfers it to the left hand. The left hand should keep the chain taut enough to prevent sagging. The right then grasps the chain hook and positions it against the left side of the pole with the chain extended.

Fig. 4

FASTENING THE CHAIN

With the chain held taut and in a horizontal position around the pole, the chain and the hook are brought together. The link that will allow the maximum tightness is inserted with the welded side out, into the horizontal slot on the chain hook.

Fig. 5

4/60 I-A-4-3

PROPER INSTALLATION and use of gins is provided through words and drawings. This page, part of the description for the 2-in-1 complete gin, is typical of those in the standard work practice at Union Electric Co

Electric Heating Costs Guaranteed

CARL L. RICHEY, Assistant General Manager, Sacramento Municipal Utility District, Sacramento, Calif.

"This program will get us the desired results or I'll eat all the erasers off all the pencils in SMUD!"

This slightly cannibalistic attitude made by Residential Sales Supervisor Robert A. Moore was really only his way of giving solid backing to Sacramento Municipal Utility District's new "Guaranteed Heating Cost Program", and in conjunction with it an intensive domestic electric heating promotion.

In the past, electric resistance heating has been only nominally promoted based on our annual load curve. Heating layouts have been made upon request and there are now some 700-800 electrically heated homes on our lines.

Also, there are probably several thousand homes with baseboard or wall units for supplementary heating, or for heating newly added rooms.

Our first resistance heating brochure using testimonials from satisfied user customers was produced in the fall of 1959 and we also advertised significantly for the first time. Thus our sales organization was reasonably prepared whenever necessary to expand the program into a full-scale promotion.

Higher system load factor bears heavily on higher percent return and accordingly management has been watching comparative seasonal peak loads for a number of years as shown in the chart on page 71. Determination of our basic load trend due to the normal increases in use of electricity has been obscured by our growth rate. For example, we had about 91,000 customers at the end of 1950 and now have 163,000. This is a compound annual growth rate of more than 6%. In 1959 it exceeded 8%.

The chart shows that the winter peak exceeded the summer peak by about 10% in 1951. The month of December 1953 was milder than normal, thus accounting for the dip in the winter peak. The winter of 1958 was considerably milder than normal and relatively mild weather was also experienced during the winter of 1959.

July, 1960 saw six consecutive days of maximum temperatures from 102 to 107 degrees and a system peak of 342 Mw was recorded at 3:00 p.m. on the sixth day. This caused our power economists to review previous forecasts and now, despite the vagaries of weather and the obscuring factor of customer growth, we have concluded that we will have a summer peak in future years. The chart (p 71) forecasts a 1965 summer peak of 706 Mw, or 41% above the expected winter load of 500 Mw—expected on the basis of the past and without considering increased resistance heating load.

Air Conditioners Significant

The great popularity of air conditioning is pushing up our summer peak of course. Heat pumps and central units are increasing in number but room air conditioners have become especially significant. In 1956 in our area, some 2,400 room units were sold and this figure doubled in 1958, doubled again in 1959, and 1960 sales were well over 11,000. In addition to greater volume, a very important factor is the increase in size of units. A few years ago ½ and ¾-ton sizes were the most popular but last year, 1½ and 2-ton units sold in greatest volume. This trend seems likely to continue.

The load projections in the chart made it clear that the time had come to step up heating promotion activities. Further, the 1965 forecast of a 41% peak differential suggested the need for something dramatic, something with real impact.

Past experience indicated to us that the customers having electric heat were generally quite satisfied with it and none with properly engineered installations had voiced any particular objections to the cost. However, conversations with various other people indicated they had very grave doubts as to operating costs. Included in this latter group were some of our own employees.

The cost element has particular significance because the Sacramento area has had low-cost natural gas service for many years, the initial supply coming from a gas field located only about 30 miles from the city. Even today after a number of rate increases in recent years, gas for domestic heating is about 6¢ per therm.

Our sales department also had a rather prolonged experience with a builder of 186 rental apartment units. There were numerous questions in the builder's mind concerning the satisfaction and operating costs of a proposed electric heating installation. The project finally went all-electric based on consumer preference for electric cooking and practically a guarantee by the heating equipment manufacturer that the installation would be satisfactory.

Because of such considerations a guaranteed program was recommended to Sales Manager Marlen N. Davis by Moore, and prompted his remark about eraser eating.

Discussions Follow

Discussions followed with representatives of the Sacramento Valley Electric League. The League agreed to pay 50% of any amount by which annual costs for electricity for heating purposes exceeded cost calculations. The guarantee would cover a three-year period. The purpose of having the customer pay 50% of any excess was to avoid giving the customer a "free ride" with no penalty at all, even if the excess was due to his method of operating his heating system.

The program applies to both single and multi-family dwellings. Cost figures featured are $73 to $88 per year for an average (1,000 to

by SMUD

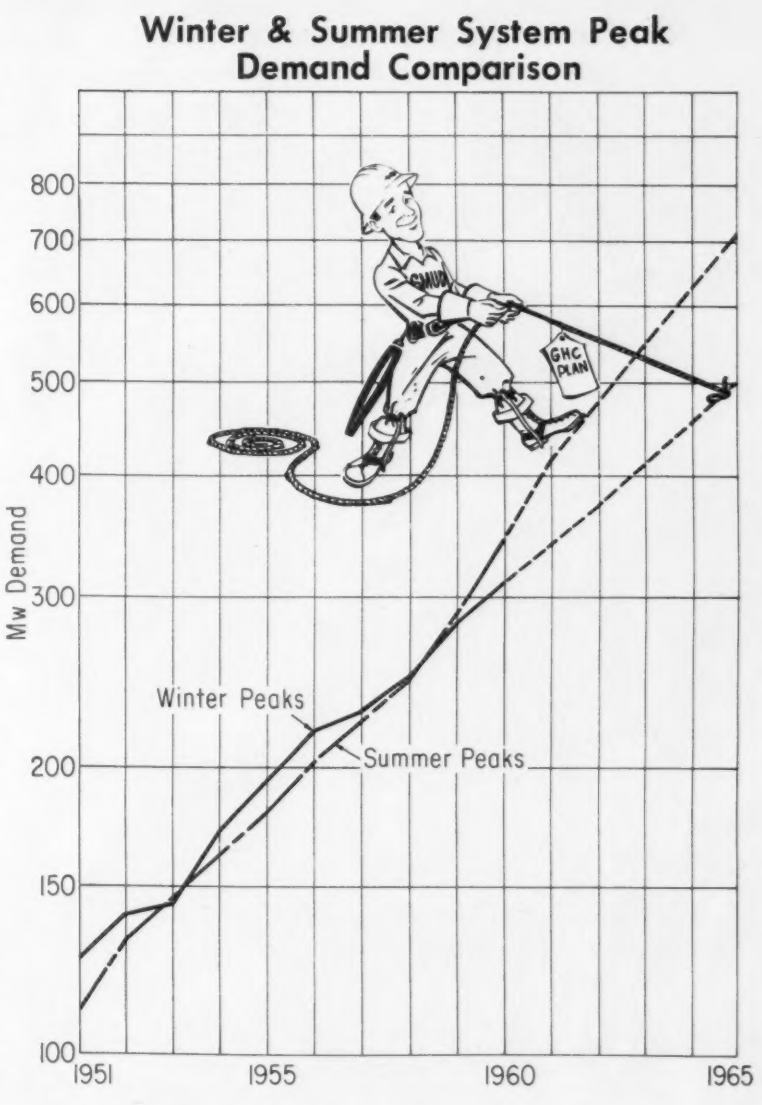
1,300 sq ft) insulated single-family residence based on a long-time average of 2,800 degree-days for the area and a 9 mill rate per kwhr after the first 1,500 kwhr on bi-monthly billing.

Heating Cost Formula

A certificate is issued in the name of the Electric League covering specific dwellings. The certificate states, "for the purpose of this guarantee, annual electric heating costs will be determined by taking actual electric bills for the four summer months, adjusting them by one-third to account for such factors as the normally higher use of electricity for non-heating purposes in the heating season, doubling this amount and then subtracting the result from the total of the electric bills for the eight months of the heating season. The guarantee assumes continuous occupancy and average winter conditions."

We bill domestic accounts bi-monthly. Adjusting summer bills by one-third is based in part on the fact that on our system, the average residential consumer uses 22.2% more electricity in the heating months than during the summer months. We knew that any formula should be as simple as possible and hoped that using this percentage figure would be satisfactory. However, applying it to actual cases proved its inadequacy.

After various efforts of "cut-and-try," it was found necessary to also take into account system saturation figures for ranges, dryers and water heaters. This was done to determine the extent to which the summer kwhr usage of all-electric customers would be below the average for all customers when absent on vacation. Estimates of winter usage by all-electric customers took into account the same saturation figures as well as the fact that water temperatures entering water heaters are about 15 degrees colder in the winter. Initial calculations were made on a kwhr basis but were translated into dollar terms for ease of understanding by customers.



The "continuous occupancy" provision in the guarantee protects against a situation where a customer's summer bills are abnormally low due to an extended absence. The "average weather conditions" provision was included to guard against an unusually severe winter. Other situations can be anticipated but to include them would produce so many "ifs" that customers and builders would rightfully become suspicious of the guarantee.

Applying the formula to the actual bills of a number of electric heating customers produced satisfactory results. However, there were other cases where the resulting cost figures for home heating were unbelievably low. If claims are received from such customers, additional facts are obtained to determine why the usage pattern produces such results. These facts will be submitted to a review board consisting of a representative of the League, a heating specialist from SMUD, and an independent consulting engineer to assure an equitable answer to the customer.

A comprehensive electric heating program represents one of the most complicated promotions a utility can undertake in the residential field.

For one thing, we need a distinguishing name or term for the prod-

(*Continued on page* 134)

GENERAL ELECTRIC

Over a Decade of BUTYL Leadership and Experience

IN 1949 ... FIRST BUTYL-MOLDED INSTRUMENT TRANSFORMERS

Butyl-molded construction—a new concept in design which revolutionized the application and performance of instrument transformers—was developed and perfected by General Electric and introduced *in 1949* on the JKM-3 indoor current transformer.

General Electric butyl-molded transformers have proved their performance and accuracy through more than a decade of on-line service. The utility industry is assured of lower replacement costs due to longer service life—because butyl is mechanically tough; chemically inert; heat resistant; impervious to weather—has high dielectric strength.

Contact your G-E Sales Engineer for full information on General Electric's complete line of butyl-molded instrument transformers for every application–600 to 15,000 volts. Or, write to General Electric Co., Somersworth, N. H. 714-01

METER DEPARTMENT

GENERAL ELECTRIC

New Analysis

EEI's T&D Committee told outages can be predicted accurately for any point on system to guide expansion costs

"Average outage frequencies can be calculated accurately for any point in a transmission and distribution system," Zane Todd, Indianapolis P&L, told the Edison Electric Institute's Transmission and Distribution Committee at Cincinnati late last month. "The calculated outage frequencies represent long-term averages. Such calculations can be used to evaluate the service reliability of existing and proposed electrical arrangements. This provides . . . a new tool which can be used along with economic principles and technical judgement for evaluating alternatives," he said.

Todd's method depends upon the outage rate per unit per day computed from several year's records for lines, transformers, substation equipment, fuses, and other system components. Records as short as 300 unit-years provide stable rates within $\pm 10\%$ for stationary equipment not exposed to weather or people. Longer periods are needed for lines (rated per mile of exposure) and other exposed equipment.

Outage rates for individual components are added to determine the outage probability of a series circuit, Todd continued. When the series circuits are in parallel, the outage rates are multiplied to determine the outage probability of all paths at the same time. Combinations of parallel and series configurations are analyzed by converting the parallel portions to series equivalents and adding their outage probabilities to those of the remaining series elements.

Calculations of outage probabilities for a 100-residential-customer sample during a 6-year period indicated an average of 1.89 outages per customer, closely verified by 1.81 outages observed by the same customers during the same period, Todd reported.

A more extensive program is under way at Pennsylvania P&L, according to H. L. Collins. Finding

Gives Planned Reliability

that its interruption records lacked the detail for searching analysis, this company has initiated a three-step approach to

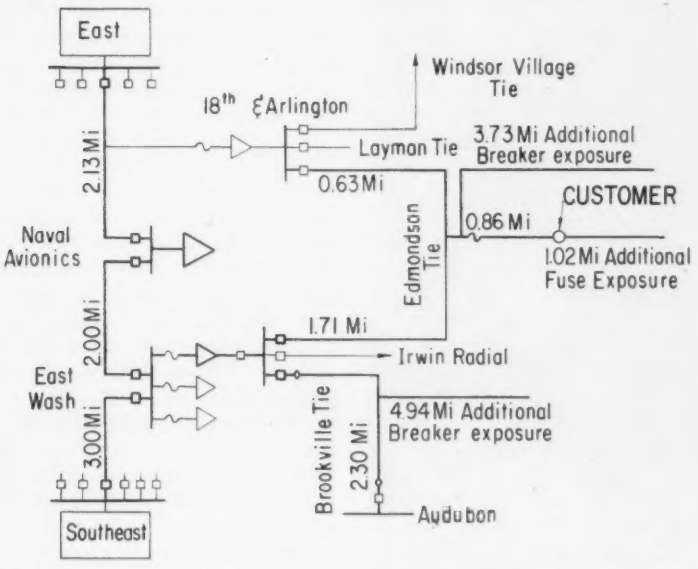
1. Analyze service records to establish a basis for improvement.

2. Advance the protection and automation of distribution plant to minimize the extent and duration of interruptions.

3. Guide re-design of distribution to gain built-in reliability.

The first step will provide a measure of service performance, pinpoint substandard locations, and provide an adequate basis for improvement, Collins said. It will provide a means of evaluating engineering designs, planning philosophies, maintenance methods, and operating practices, pointing the way to beneficial expenditures as well as to economies obtainable without impairing service.

Service performance will be measured in terms of four criteria:



FINAL STEP OF OUTAGE CALCULATIONS for customer (above) illustrates method which gives outage rate closely verified by 6-year record (below)

System Element	Probable Daily Rate
Loss of all sources to Edmondson Tie (From previous steps), U	$= 0.002 \times 10^{-6}$
4-kv line, both breakers open, U = (42 × 10⁻⁶ per mi.) (0.63 + 3.73 + 1.71 mi.)	$= 254.940 \times 10^{-6}$
4-kv line, simultaneous phase down both sides of Customer's tap, U = (0.63 × 204 × 10⁻⁶) (1.71 × 204 × 10.6)	$= 0.045 \times 10^{-6}$
Customer Tap, phase down U = (0.086 × 204 × 10⁻⁶)	$= 17.544 \times 10^{-6}$
Line fuse blown, U = 1.11 × 970 × 10⁻⁶	$= 1075.730 \times 10^{-6}$
Distribution transformer fuse blown, U	$= 182.000 \times 10^{-6}$
Loss of all sources to Customer, U	$= 1530.259 \times 10^{-6}$

Average Annual Customer Outage Rate = 365 (1530.259 × 10⁻⁶) = 0.5585
Probable Average No. Outages in 6 Years = 6 × 0.5585 = 3.35
Observed No. of Outages in 6 Years (1954-1959) = 3.

GENERAL ELECTRIC
Over a Decade
of BUTYL Leadership and Experience

IN 1950...FIRST INDOOR-OUTDOOR CURRENT TRANSFORMERS

Butyl molding of General Electric instrument transformers made possible the first indoor-outdoor current transformers—the JKP-O—introduced by General Electric *in 1950*, helping utilities reduce stock requirements, cut inventory costs.

Eleven years of performance-proved service have made General Electric butyl-molded instrument transformers the *leaders of the industry.*

Contact your G-E Sales Engineer for complete information on General Electric's full line of butyl-molded instrument transformers—600 to 15,000 volts—or write General Electric Co., Somersworth, N. H.

METER DEPARTMENT
GENERAL ELECTRIC

To provide utilities with a new means of low-cost indoor and outdoor metering, *in 1954*, General Electric extended its butyl line to include the first butyl-molded *miniature* current transformers—the Type JCA-O.

Butyl-molded construction—a development of General Electric research—made possible this smaller size, lighter weight current transformer—lowering the cost of metering installations.

G.E.'s butyl line offers: current; potential; indoor-outdoor; window; bar; wound; miniature; fused or unfused; 600 to 15,000 volts. Contact your G-E Sales Engineer or write General Electric Co., Somersworth, N.H.

714-02

METER DEPARTMENT

GENERAL ELECTRIC

1. Number and frequency of customer interruptions.
2. Time of day at which interruption occurs.
3. Duration of each interruption.
4. Conditions prevailing at the time of interruption.

In addition, Collins said, consideration will be given to customer relations and public opinion as measured by newspaper reports, number interrupted, and effect upon "critical" customers.

Recent investigations of connector failures "reveal no basis for suspecting aluminum connectors of being less reliable than copper. In fact our data quite clearly shows both aluminum and copper connectors to be far superior to the practice of applying them," reported M. R. Mosquini, Southern California Edison.

Analysis of interruptions during 1960 indicates a predictable failure rate of 0.00124% per year for the 5 million connectors on primary distribution circuits, he continued. Two thirds of these will be blamed as the cause of interruptions while the others will extend the duration of interruptions. Taken together, connector failures will cause 2% of the total customer minutes of interruption, he predicted.

Careful investigation of failed copper-to-aluminum connections will show failure occured in the copper portion, Mosquini predicted. The most frequent cause will be inadequate cleaning during installation. Uninhibited corrosion will prove a less frequent cause. Accordingly, he said, a broad-based program has been initiated to impress upon connector users the need for proper installation. Recommended procedure is (1) wire brush contact surfaces until clean, removing irregularities with emery, then (2) promptly coat with inhibiter.

Planned tree trimming, with emphasis upon locations requiring special attention, has cut primary failures in trees from an average of 2.8 in 1955 and 1956 to 0.33 in 1959 and 1960, said Thomas Hunter, Duquesne Light. Trimming expenditures to achieve this are running $140 per circuit mile, compared with $70 in earlier years.

Other measures taken to overcome tree interruptions, according to Hunter, include:

1. Re-spacing conductors from 16 to 32 in.
2. Applying line fuses or reclosers where adequate trimming is not possible.
3. Installing poles of adequate height for effective tree trimming.
4. Using tree wire where trimming is impractical.
5. Re-routing conductors where the established line cannot be maintained or where an alternate line is available.

Meanwhile research continues to develop a means for inhibiting tree growth under utility lines. According to D. V. Green, Connecticut L&P, the EEI-Battelle program has explored 11 compounds synthesized for the purpose by Battelle and is observing the effect of six of these on a selected group of trees. Work is continuing with another compound, as well as to develop effective application methods, he said.

Use Ducts for Reliable UG

Service reliability seldom concerns the developer who specifies underground distribution, said C. R. Machen, Pacific G&E. Developers seek competitive advantage and, because they or their customers must pay the excess cost over conventional overhead service, press for the direct-buried cable and pad-mounted transformers. But increasingly unsatisfactory experience with such installations made since 1931 forced PG&E to specify cable ducts in parkway or sidewalk areas.

Repairs have been costly for the direct-buried systems, reported Machen, often requiring temporary overhead lines and installing duct cable at company expense. Even locating the faults has proved difficult, particularly on rear property easements, because lots have been fenced and landscaped. In some cases, service holes have been buried and it is not uncommon to find small buildings on easements. About the only exception to this experience, he said, has been with certain direct-buried shielded oil-base rubber 5-kv cable installed in the late 40's.

In discussion, V. O. Bernthal, Commonwealth Edison, defended the butyl-insulated direct-buried cable used extensively by his company for residential distribution. Its performance has been "very good," he said, and maintenance

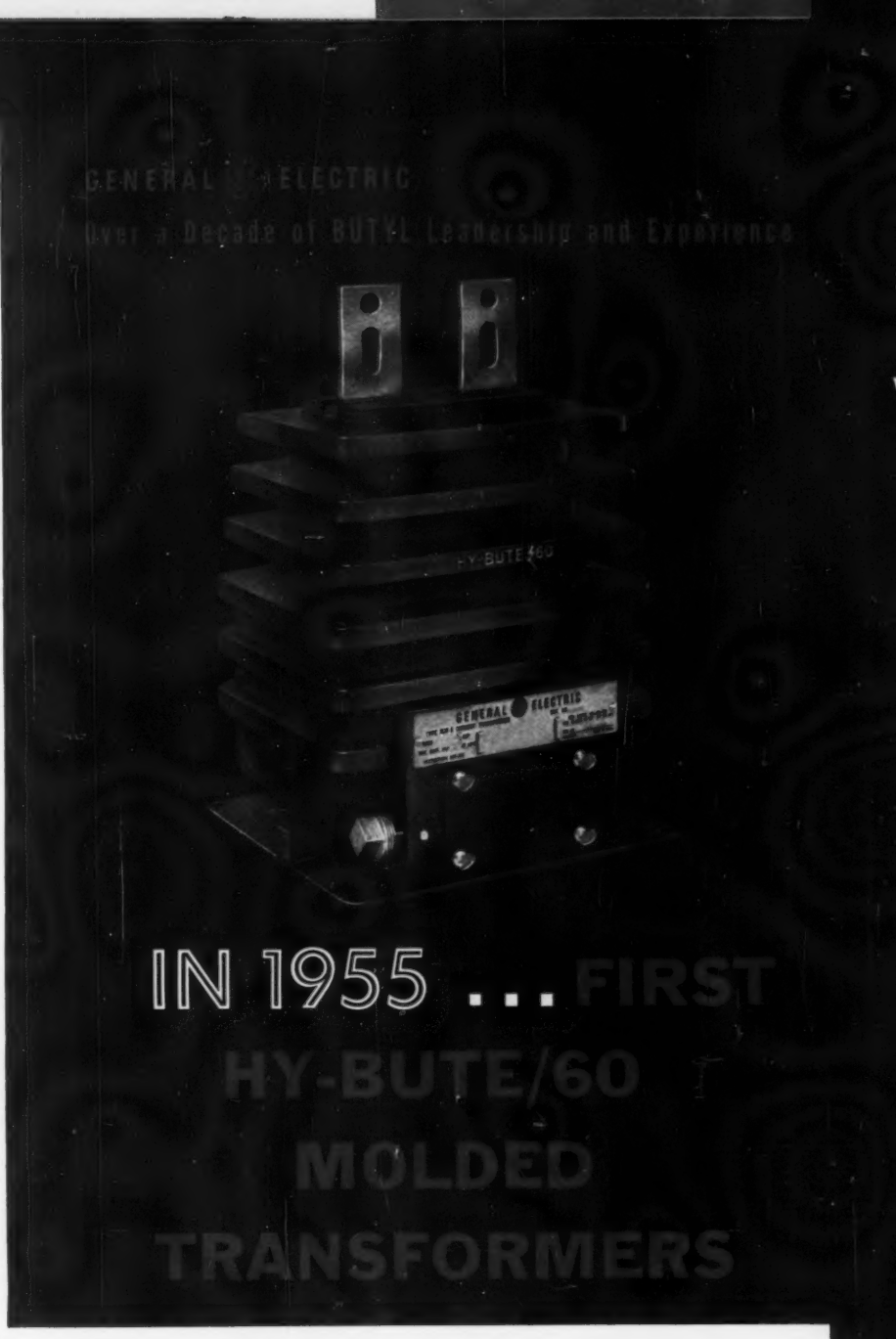
"very reasonable—perhaps less than open wire."

The forthcoming 1959 Underground Cable Performance Report will show continuation of the rising trend of trouble in high-voltage cable with a rate of 8.83 per 100 cable miles, reported H. L. Davis Jr, Philadelphia Electric. This compares with 8.35 per 100 in 1958, reflecting a large rise in "miscellaneous" troubles. A big factor in this failure rate was "solid" cable with a 9.8-per-100-mile rate. The 25 to 45-kv oil-filled cable jumped from 6.2 to 21.4 per 100 miles. But pipe cable maintained its record with a fourth trouble-free year.

Joint failures also increased for the third consecutive year, reaching 1.57 per 1,000, "unknown" causes being the major contributor, Davis continued. But termination troubles dropped to 0.98 per 1,000, slightly below the recent peak of 1.05 set in 1958.

Critical review of conditions and correcting those found to be restrictive have enabled Pennsylvania P&L to set higher maximum ratings on its 373 miles of 230-kv transmission without seriously affecting its performance, said C. H. Schofer. Lines built since 1950 with clearances for operation at 200F or with 1 in. of radial ice were found limited by conductor annealing but, because the steel core of ACSR retains its strength up to 450C, capable of 10,000 hours at 125C with only 11% strength loss in the composite conductor. Evaluating recorded ambient temperatures and wind velocities showed that 795 MCM conductors would carry 1,281 amp in summer and 1,455 in winter. Hours of conductor temperatures in excess of 125C at these current loadings would probably not exceed 36 during a typical year, he indicated.

Older circuits, some of them built before 1930, had been designed for NESC clearances with 1-in. ice or 120F conductor temperature. For these, clearances to underlying facilities proved an additional limitation to current ratings, according to Schofer. But field surveys, elimination of malleable suspension clamps, and re-inforcement of broken strands and questionable splices permitted these lines to be rated 1,125 amp in summer and 1,325 in winter.



To meet the special needs of high voltage, outdoor applications where creep-tracking and corrosion presented unusual problems, General Electric *in 1955*, announced the JKW-5 outdoor current transformer—the first HY-BUTE/60 molded instrument transformer.

HY-BUTE/60—a compound of butyl—is another General Electric development. Butyl construction—introduced in 1949, is now the *leading instrument transformer insulation*. Whatever your instrument transformer needs, General Electric offers the most complete line of *butyl* or *HY-BUTE/60 molded units*—600 to 15,000 volts—to meet all requirements.

For full information contact your General Electric Sales Engineer, or write to General Electric Company, Somersworth, N. H.

METER DEPARTMENT

GENERAL ELECTRIC

GENERAL ELECTRIC

Over a Decade of BUTYL Leadership and Experience

IN 1958 . . .

In 1958, General Electric introduced the *first butyl-molded potential transformers*—both indoor and outdoor designs—providing utilities with another new way of reducing relaying and metering costs.

The addition of the JVW-3 butyl potential transformer helped General Electric offer the most complete line of butyl-molded instrument transformers available: 600 to 15,000 volts; current or potential; indoor and outdoor units; combination indoor-outdoor designs; window; wound; bar; miniature; fused or unfused.

For full information contact your General Electric Sales Engineer, or write to General Electric Company, Somersworth, N. H. 714-03

GENERAL ELECTRIC

AIEE Topic

Working subcommitte at Detroit meeting discuss design of distribution facilities for cement, other plants

In designing the power distribution system for a new cement plant, the owner should study the advisability of purchasing power, whether the outdoor part of the main plant substation should be customer or utility owned, and provision of an alternate power source.

These were among the practices recommended in a report to the third American Institute of Electrical Engineers' Cement Industry Technical Conference recently at Detroit, Mich. It was prepared by the distribution and related products working group, a subcommittee. The group consists of representatives of cement plants, machinery manufactures, electrical equipment manufactures, designers and builders.

The report stated that electrical designers should consider extra-creepage insulators and bushings in the outdoor substation; use circuit breakers for primary protection of substation apparatus; use double-ended substations in sizes above the 5,000 to 7,500-kva range; and, use station type arresters to protect outdoor substation equipment.

Would Limit Drop

Other recommendations include grounding of the power system through a neutral grounding resistor at the distribution level (2.4 to 13.8 kv); a feeder breaker for each operating department at the distribution level; and use of 4.16 kv as the distribution voltage for plants of 20,000 kva and below and either the split-bus 4.16-kv system or the 13.8-kv system for larger plants.

The power system should be designed to limit voltage drop during the starting of large motors (at distribution voltage) to a maximum of 15% of system voltage, the report stated. Synchronous machines should be isolated from the utility system before any reclosing subsequent to a plant power outage.

A suggested relaying outline, covering the choice and setting of pro-

Cement Plant Power

tective relays to initiate selectively the isolation of faults on the plant's distribution system, was included in recommended practices. The working group urged that shielded cable be used for distribution voltages above 2.4 kv, with cable sizes large enough to withstand the thermal effects of the maximum fault on the distribution system. For adequate ampere capacity, multiple cables should be considered where sizes above 500-MCM single-conductor are required.

In laying out low-voltage substations, the group recommended utilization voltages of 600 v or lower over radial feeders from individual lower-voltage substations for each department. Substation capacity should be about 85% of the connected maximum operating horsepower. The recommendations covered practices for power distribution for plant expansion and power distribution in the quarry.

In discussing the interrupting capacity to cement plant operation, Leo E. Swanson, Peerless Cement Co, and Stanley E. McDowell, Allis-Chalmers Mfg. Co, said protection of distribution systems requires the rapid opening of circuits to isolate the fault and the limiting of the magnitude of system disturbances. The only way the plant operator can be certain his system has not outgrown its protection is to make a short-circuit study of the system.

The principle of electrifying the new Dundee Cement plant along the same "flow lines" as set up for the process machinery adds materially to the availability of the electrical equipment and provides a plant easier to operate, especially during abnormal conditions. This was the conclusion of Jack A. Allen, St. Lawrence Cement Co, designer of the 6-million bbl plant (peak demand 14,240 kw) after one year's operating experience.

Static power supplies for adjustable speed drives offer definite advantages over other systems in use, reported R. Bruce Jones, General Electric Co, and A. R. Olds Jr, Kaiser Engineers. Static power supplies provide economies in maintenance, operation, space requirements, and sometimes in first cost. Electrically, they offer higher efficiency, maximum flexibility and high accuracy control. Also, they may be integrated more easily into the more complex systems required by automatic process control in cement plants. The magnetic amplifier-rectifier supply and the thyratron supply appear to be the most highly developed units at present.

Instrumented and centralized controls in cement plants have made possible a better product, reduced maintenance and fuel costs, and increased the availability of equipment and over-all production. This was reported by Walter Walkling, Ideal Cement Co, who added that all instrumentation and controls are electronic. The development of magnetic amplifiers and static rectifiers for the control of variable speed drives has simplified the remote control scheme. Electric interlocking to assure the operation of all equipment in its sequence is normally provided.

Give Three Methods

Three methods of predicting motor-starting voltage were presented by Timothy Tseh-Ming Ho, Kaiser Engineers, and Harold S. Robinson, Westinghouse Electric Corp, as they considered the power distribution system for starting motors in cement plants. The simplified method, they said, neglects the resistance in the system, giving a quick but approximate answer. The constant-load-impedance method includes resistance, giving a more accurate answer. The method using variable load impedance gives the most accurate solution because it includes resistance and the effects of the dynamic characteristics of the initial loads.

In suggesting how to reduce hazards to personnel from control wiring in cement plants, H. P. Cassel, Whitehall Cement Mfg. Co, urged the use of multi-conductor cable, tagged for identification of supply source; color-coded wiring for various control voltage levels; insulating barriers between terminals where potential hazards exist; and, tagging of relays, switches, and fuses with voltage source and level.

GENERAL ELECTRIC

Over a Decade
of BUTYL Leadership and Experience

IN 1960...

Another new butyl-molded transformer from General Electric . . . the Type JVP-O, 600-volt potential transformer has set new standards of design; accuracy; burden capacity and voltage range.

Butyl-molded construction—a development of General Electric research—has been performance proved by over eleven years of dependable service.

General Electric leads the industry in producing industry's only complete line of butyl-molded transformers. Contact your G-E Sales Engineer for full information, or write General Electric Co., Somersworth, N.H.

GENERAL ELECTRIC

GENERAL ELECTRIC

Over a Decade of BUTYL Leadership and Experience

IN 1961 ... MORE BUTYL-MOLDED INSTRUMENT TRANSFORMER FIRSTS BY GENERAL ELECTRIC

So far this year, General Electric has announced four additional butyl-molded instrument transformers—the JCB-5 (left), the JCW-5 (center background), the JCM-3 (center foreground), and the JCD-5 (right) for indoor and outdoor application to operate meters, relays and control devices. Thirteen additional butyl-molded units will be introduced during 1961.

What's behind this history of General Electric's 'More than a Decade of Butyl Leadership and Experience'? Simply this, *savings through quality*. For example:

Butyl requires no maintenance—G-E butyl-molded transformers will not corrode, harden or crack with age or extreme weather; never need painting; are easy to clean, have no porcelain insulators to break.

Butyl lowers installation costs—Tough, flexible butyl construction protects against mechanical shock, damage; are up to 50% smaller, 33% lighter than other units of equal ratings for fast, easy handling.

Butyl cuts inventory costs—Any-angle mounting of G-E instrument transformers supersedes bottom, top and side-connected designs . . . simplifies stocking and ordering.

Butyl increases safety—Butyl cannot catch fire or explode. And at high voltage, G-E Hy-Bute/60® insulation prevents creep-tracking.

Whatever your application, select your instrument transformers from General Electric's complete line of butyl-molded units: current; potential; indoor-outdoor; window; bar; wound; miniature; fused or unfused; 600 to 15,000 volts. For more information, contact your G-E Sales Engineer or write General Electric Co., Somersworth, N. H. 714-04

METER DEPARTMENT

GENERAL ELECTRIC

News of Manufacturers

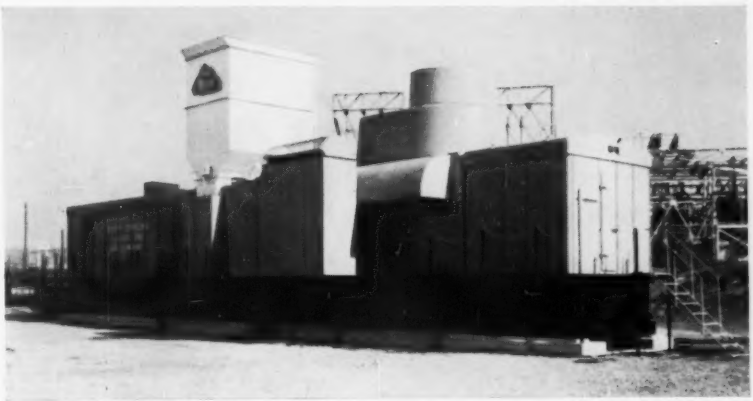
Packaged Gas Turbine Operated for Customers

As this week's *Electrical World* went to press, several hundred electric utility and industrial customers witnessed the operation at Schenectady, N. Y., of the nation's first gas-turbine package power plant. Designed to provide a low-cost, remote-controlled, unattended power source, the 11,250-kw General Electric Co gas-turbine plant can be shipped by rail, installed and normally placed in commercial service in about ten days—in or near residential areas if need be.

Representatives of utilities and industrial companies saw the GE power plant operating under conditions similar to those under which it will operate on the customer's system. Following a three-day demonstration, the gas-turbine package will be shipped to the South Carolina Electric & Gas Co which has purchased four of the units.

The first of the four power plants will be installed at Burton near the southern extremity (Buford area) of the SCE&G service area. The second unit will be installed at Charleston, third at Burton, fourth at Charleston.

The new packaged power plant is rated 11,250 kw for peaking service (1,000 hr/yr) at NEMA conditions (80F and 1,000-ft altitude). Overall dimensions are about 80 ft long, 22 ft wide, and 16 ft high—only 4,000 sq ft of land area is required. The unit is suitable for operation at ambient temperatures from a minus 40F to a plus 120F. A heat rate of 17,400 Btu/kwhr for gas operation has been established by GE engineers—17,200 Btu/kwhr for oil operation. Equipment costs are reported at $85 per peaking kw, with plant installation costs upping the total installed costs to $89.50 per peaking kw. Maintenance costs are estimated to be about 0.35 mils per kwhr for gas operation—0.59 mils for oil. Full load on-the-line service, from a cold start, has been achieved in about 9 min. The new plant consists of power unit, generator unit, and associated switchgear, all mounted on a simple foundation. Two "I" beams run the full length of the foundation and act as rails to facilitate moving the units into position.



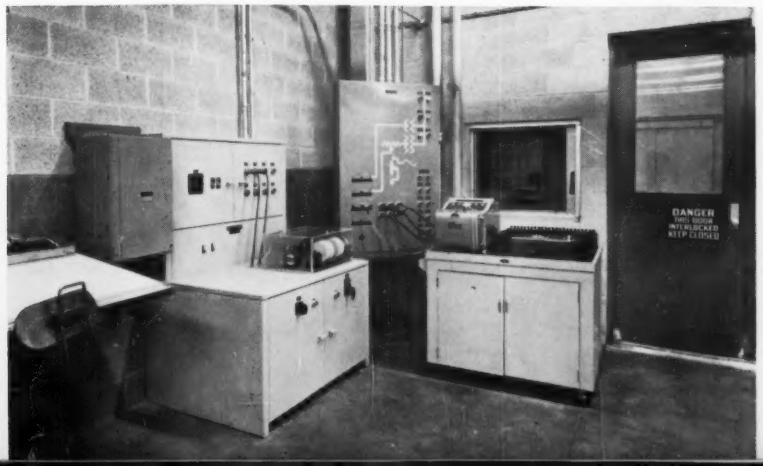
GE'S 11,250-KW GAS TURBINE will be shipped to South Carolina E&G Co

Designed for remotely controlled unattended operation, while retaining provisions for manned operation, the unit is completely self-cooled, eliminating the need for any external cooling water supply.

The plant's acousic treatment permits operation in a suburban area. At a distance of 200 ft, where the ambient noise background level was 78 db, a maximum level of 84 db was measured with the unit operating at rated load.

One of the big economic advantages of the packaged concept is that the plants involve 95% equipment, 5% installation costs. This allows 95% of the total installed cost to receive the cost advantages of design standardization, repetitive manufacturing, and volume production.

Square D Completes Short-Circuit Lab

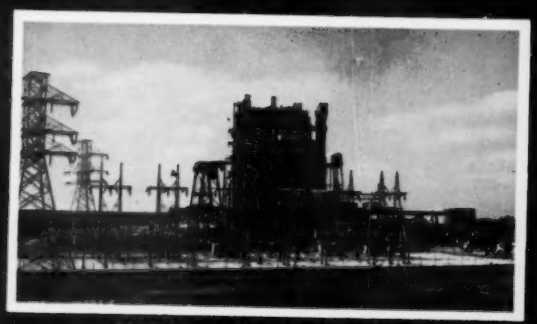


A new short-circuit laboratory for comprehensive testing of protective capacity of distribution equipment has been completed by Square D Co. Located at Cedar Rapids, the laboratory consists of a control area, test area, and building housing three single-phase power transformers.

In the two test cells, low-voltage short-circuit currents are measured with coaxial shunts which provide accuracy over a 10,000-150,000-

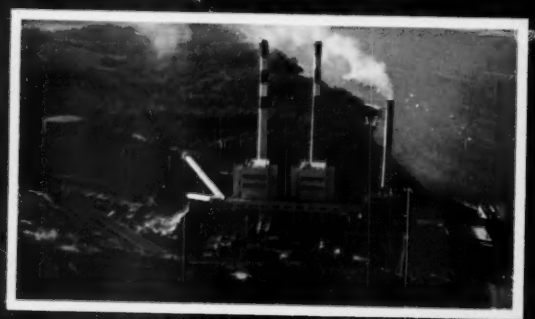
(*Continued on page* 83)

MORE PAGES FOR EBASCO'S



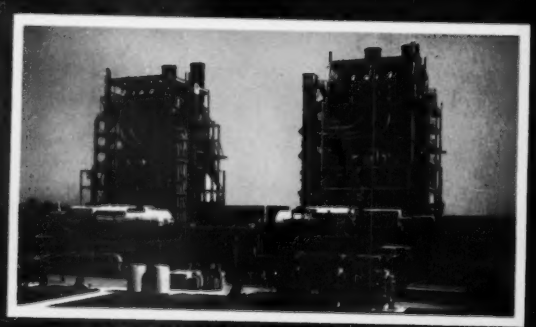
GRAHAM STEAM ELECTRIC STATION
(Unit No. 1)—220,000 KW
for Texas Electric Service Company

OCOTILLO STEAM ELECTRIC STATION
(Unit Nos. 1 and 2)—220,000 KW
for Arizona Public Service Company

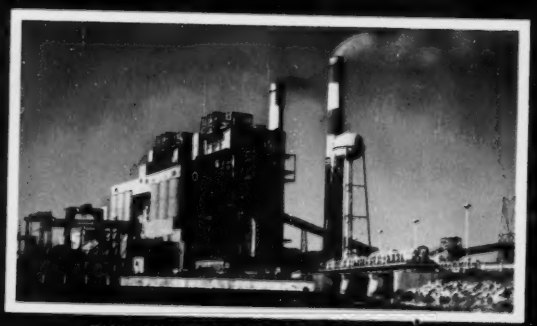


PORT JEFFERSON POWER STATION
(Unit No. 4)—185,000 KW
for Long Island Lighting Company

MONTROSE STEAM ELECTRIC STATION
(Unit No. 2)—175,000 KW
for Kansas City Power & Light Company

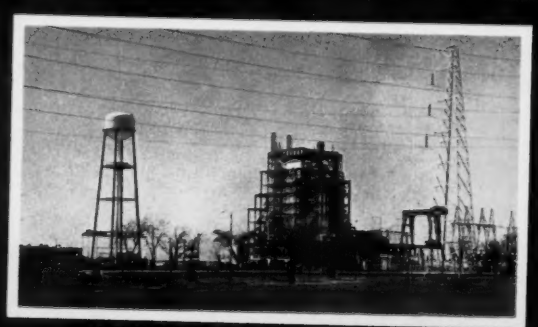


SAM BERTRON STEAM ELECTRIC STATION
(Unit No. 4)—220,000 KW
for Houston Lighting & Power Company



DAVE JOHNSTON STEAM ELECTRIC PLANT
(Unit No. 2)—100,000 KW
for Pacific Power & Light Company

YOKOSUKA THERMAL POWER STATION, in Japan (Unit No. 1)
265,000 KW—International General Electric Company
for Tokyo Electric Power Company, Inc.



NORTH LAKE STEAM ELECTRIC STATION
(Unit No. 1)—175,000 KW
for Dallas Power & Light Company

ALBUM OF ACHIEVEMENT

NOXON RAPIDS HYDROELECTRIC DEVELOPMENT
(Unit No. 4)—100,000 KW
for The Washington Water Power Company

T. H. WHARTON STEAM ELECTRIC STATION
(Unit No. 2)—220,000 KW
for Houston Lighting & Power Company

in 1960 12 more major projects completed

Shown here are the 12 major Engineering and Construction Projects EBASCO completed during 1960 at a total cost of $290 million. Located in seven states as well as in Japan and Brazil, they range in cost from $9 million to $54 million.

PEIXOTO-FURNAS-BELO HORIZONTE
345-400 Kv Transmission Line in Brazil
for Central Eletrica de Furnas S. A.

Our brochures describe EBASCO services and how they may be of use to you. For copies, write to Ebasco Services Incorporated, Dept. 2, Two Rector Street, New York 6, N. Y.

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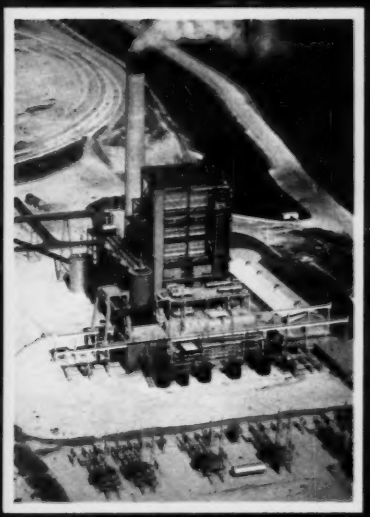
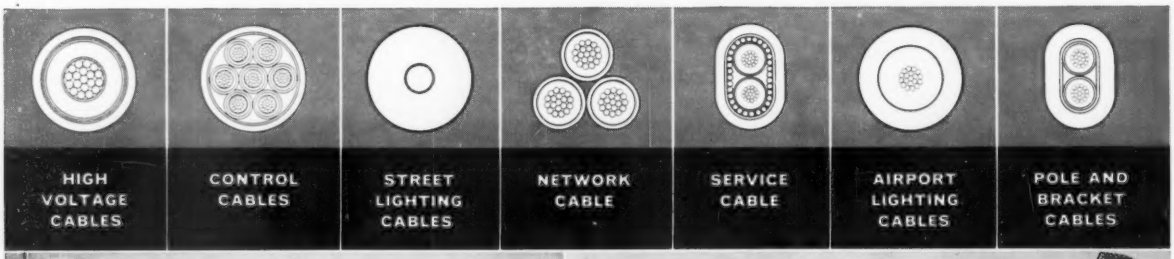


H. B. ROBINSON STEAM ELECTRIC PLANT
(Unit No. 1)—182,000 KW
for Carolina Power & Light Company

When dependability is of vital nature ...a natural selection is proven-quality

The consistent selection of Paranite by Power Users in all parts of the country is significant of its dependability. Producing reliable, high-quality power cable has been a Paranite specialty for 71 years... from 600 volt network through 28,000 volt power cable. You can depend upon it... "If it's Paranite, it's right.®"

PARANITE® POWER CABLE

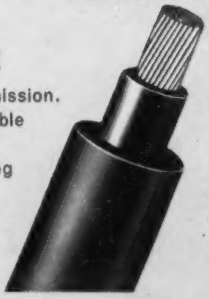


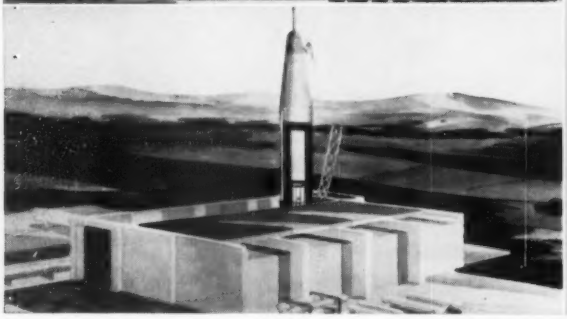
The Enrico Fermi Atomic Power Plant

near Monroe, Michigan, operated by the Power Reactor Development Company and the Detroit Edison Company. Paranite was selected to supply 600 V. network and 5,000 V. shielded cable for the nuclear section. Illustrated at right is a typical Paranite Power Cable.

Indian River Generator Plant

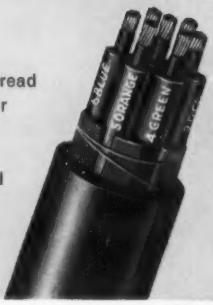
of the Orlando, Florida, Utilities Commission. From transmission line... to power cable ... through control cable... Paranite was specified to carry the load in serving this growing area. Illustrated at right is one of Paranite's complete line of 600 V. Network Cable.





Missile Bases

provide another example of the widespread and diversified use of Paranite in power distribution throughout the nation. Paranite Control Cables are produced in a complete range of insulation and jacket types. Illustrated at right is a typical Paranite Control Cable.



For more information on high voltage, control, street lighting, network, service and airport cables contact your local Paranite representative... or write Paranite Wire and Cable Division, Dept. 204, 2601 S. Adams St., Marion, Indiana.

Since 1890

PARANITE WIRE & CABLE DIVISION

ESSEX WIRE CORPORATION, Marion, Indiana

MANUFACTURING PLANTS: Marion, Ind.; Jonesboro, Ind.; Tiffin, Ohio; Anaheim, Calif.

Sales Offices and Redistribution Warehouses in all Principal Cities

amp range. Medium-voltage circuits are measured with current and potential transformers. Test sequences will be set up and automatically controlled to a fraction of a cycle by a cam timer. The timer energizes the station, initiates the fault, operates the test sample, and opens the back-up breaker. It also starts and stops high-speed cameras and a 14-channel oscillograph. A six-phase ignitron rectifier is included in the facilities to provide test circuits for dc products.

A-C to Design Italian Fuel-Processing Plant

The Italian National Committee for Nuclear Energy (CNEN) announced recently that a contract had been signed with the Allis-Chalmers Manufacturing Co for the detailed design of a uranium-thorium fuel reprocessing plant to be built in Southern Italy. The contract for approximately $1,000,000 was signed by Professor Ippolito and Harold Etherington, gen manager of A-C's atomic energy division.

The plant will recover the uranium-thorium fuel material from the irradiated fuel assemblies of the Elk River Reactor, being built in Minnesota by Allis-Chalmers under the US Atomic Energy Commission's second round power demonstration program. Arrangements for transfer of the fuel material involve the close cooperation of the US Atomic Energy Commission, Euratom and CNEN. The fuel material will be reconstituted and new fuel assemblies from the Italian plant will be returned to the reactor for reuse.

The nuclear power department (Washington) of Allis-Chalmers recently completed the initial phase of its contract with CNEN covering the preliminary design of the plant and a reactor evaluation study based on the use of uranium-thorium fuel elements. The over-all program, which includes work already underway at the CNEN laboratories in Italy, will continue to be directed by Dr. Ing. Aldo Forcella, director of the Reactor Div of CNEN. The portion of the project which is centered in Washington will continue to be managed by John K. Davidson.

Allis-Chalmers has announced that the Blaw-Knox Co, of Pitts-

(*Continued on page* 86)

ONLY COLORED RUST-INHIBITIVE ALUMINUM PAINTS*

All aluminum paints are not the same. There are different kinds.

Most aluminum paints have excellent light and heat reflecting properties. Some, in addition, are also available now in bright colors.

Subalox Anodine Finishes are like these, too, but have one outstanding difference: they are the only colored aluminum paints made in the United States with a rust-inhibitive base. They contain the exclusive Subox formula of suboxide of lead—therefore they give chemically-active protection.

Available in Azure Blue, Mist Green, Golden Beige and Bronze, Subalox Anodine Finishes are the newest color development for maintenance painting of substations, transmission towers, power plants and other equipment. These adhere to weathered galvanizing; also are compatible with other existing paints and primers.

They are easy to apply by brush, spray or roller; and because they are rust-inhibitive, only a single coat is needed to give long-life protection.

Ask for Subox Technical Bulletin No. 7 that shows colors and gives full details. Your local Subox sales engineer can supply a copy, or write direct to the factory.

*Patent Pending

Subox Inc.
Trade Mark

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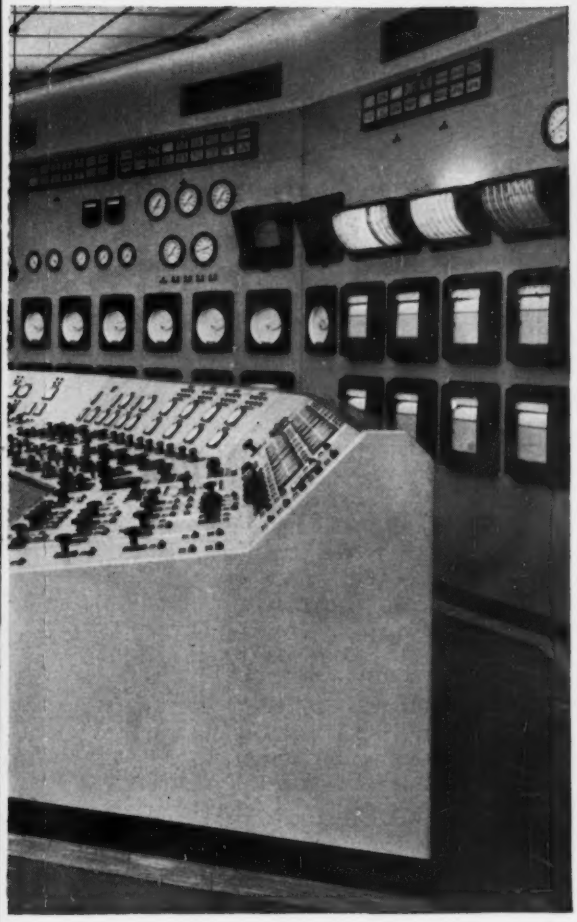
Sales Engineers in Most Major Cities
Affiliated Plants: Canada, Mexico, England, Belgium, Switzerland, Austria, Australia, New Zealand

IT'S BAILEY FOR AMERICA'S

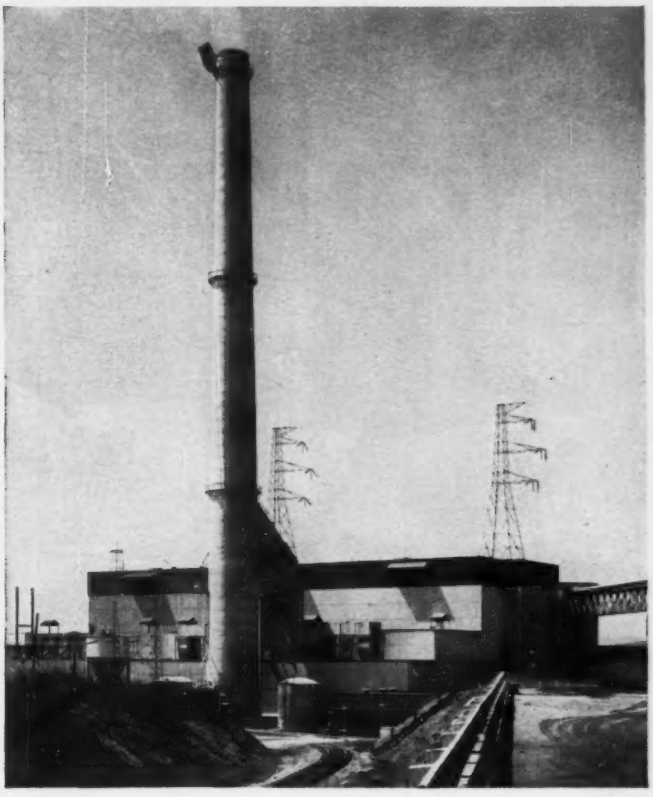
1959 STEAM-ELECTRIC PLANT HEAT RATES FROM FEDERAL POWER COMMISSION REPORT S-143

	Btu/kw-hr	Meters	Combustion Control	Feed Water Control	Superheat Control
1. Dickerson (Potomac Electric Power Co.)	9,007	B	B	B	B
2. Clinch River (Appalachian Power Co.)	9,011	B	—	B	B
3. Kanawha River (Appalachian Power Co.)	9,098	B	B	B	B
4. Silas McMeekin (South Carolina Electric & Gas)	9,130	—	—	—	—
5. Muskingum River (Ohio Power Co.)	9,170	B	B	B	B
6. River Rouge (The Detroit Edison Co.)	9,170	—	—	—	—
7. Clifty Creek (Indiana-Kentucky Electric Corp.)	9,173	B	B	B	B
8. G. G. Allen (Duke Power Co.)	9,174	B	B	B	B
9. Tanners Creek (Indiana & Michigan Electric Co.)	9,176	B	B	B	B
10. Shawville (Pennsylvania Electric Co.)	9,179	B	—	—	B
11. Kammer (Ohio Power Co.)	9,203	B	B	B	B
12. St. Clair (The Detroit Edison Co.)	9,250	B	B	B	B
13. Kyger Creek (Ohio Valley Electric Corp.)	9,284	B	—	B	B
14. Portland (Metropolitan Edison Co.)	9,322	—	—	—	—
15. Oak Creek (Wisconsin Electric Power Co.)	9,336	B	B	B	B
16. Bayshore (Toledo Edison Co.)	9,365	B	B	B	B
17. Milliken (N. Y. State Electric & Gas Corp.)	9,374	B	—	B	—
18. Philip Sporn (Appalachian Power Co.)	9,381	B	B	B	B
19. John Sevier (Tennessee Valley Authority)	9,390	—	—	—	—
20. Mandalay Beach (Southern California Edison Co.)	9,397	B	B	B	B
21. Gallatin (Tennessee Valley Authority)	9,420	—	—	—	—
22. Huntington (Southern California Edison Co.)	9,436	B	B	B	B
23. Colbert (Tennessee Valley Authority)	9,460	B	B	B	B
24. Will County (Commonwealth Edison Co.)	9,460	B	—	B	B
25. Agua Fria (Salt River Project A.I.F. Dist.)	9,473	B	B	B	B
26. Salem Harbor (New England Power Co.)	9,485	B	B	B	B

***per 1959 Heat Rates reported by FPC**



Bailey Controls for combustion, feed water and steam temperatures at the Dickerson Generating Station of Potomac Electric Power Co. The Federal Power Commission reported a 1959 heat rate of 9007 Btu per kw-hr, ranking it as No. 1 plant in efficiency in the United States.



NO. 1* STEAM PLANT

and for 20 out of the next 25 "most efficient" plants, too

Most efficient power plant in 1959, as rated by the Federal Power Commission, was Dickerson Station of Potomac Electric Power Co. And for measuring and controlling functions that helped attain this record, Dickerson relies on Bailey Meters and Controls.

Moreover, *in 21 out of all 26* "most efficient" plants, with heat rates under 9500 Btu per kw-hr, Bailey Meters and Controls are used for some or all functions.

Why? The reasons aren't hard to find. Bailey engineers have worked hand-in-hand with leading power engineers for more than 45 years to advance steam-plant efficiency rates . . . have pioneered the research and development of improved measurement and control techniques that have produced much of today's high reliability of steam-plant operation . . . have simplified and verified instrumentation and control systems to the point where automation can be approached confidently.

And now, working to extend the benefits of automation over the full range of plant operations, Bailey offers systems incorporating advanced techniques for scanning, alarming, logging, computing, digital logic and sequencing . . . all co-ordinated with established analog equipment to provide maximum safety, economy and reliability . . . all compatible with the needs of power management, technical and nontechnical.

Ask your nearby Bailey District Office or Resident Engineer how new Bailey concepts and advanced systems techniques may be applied to your operations.

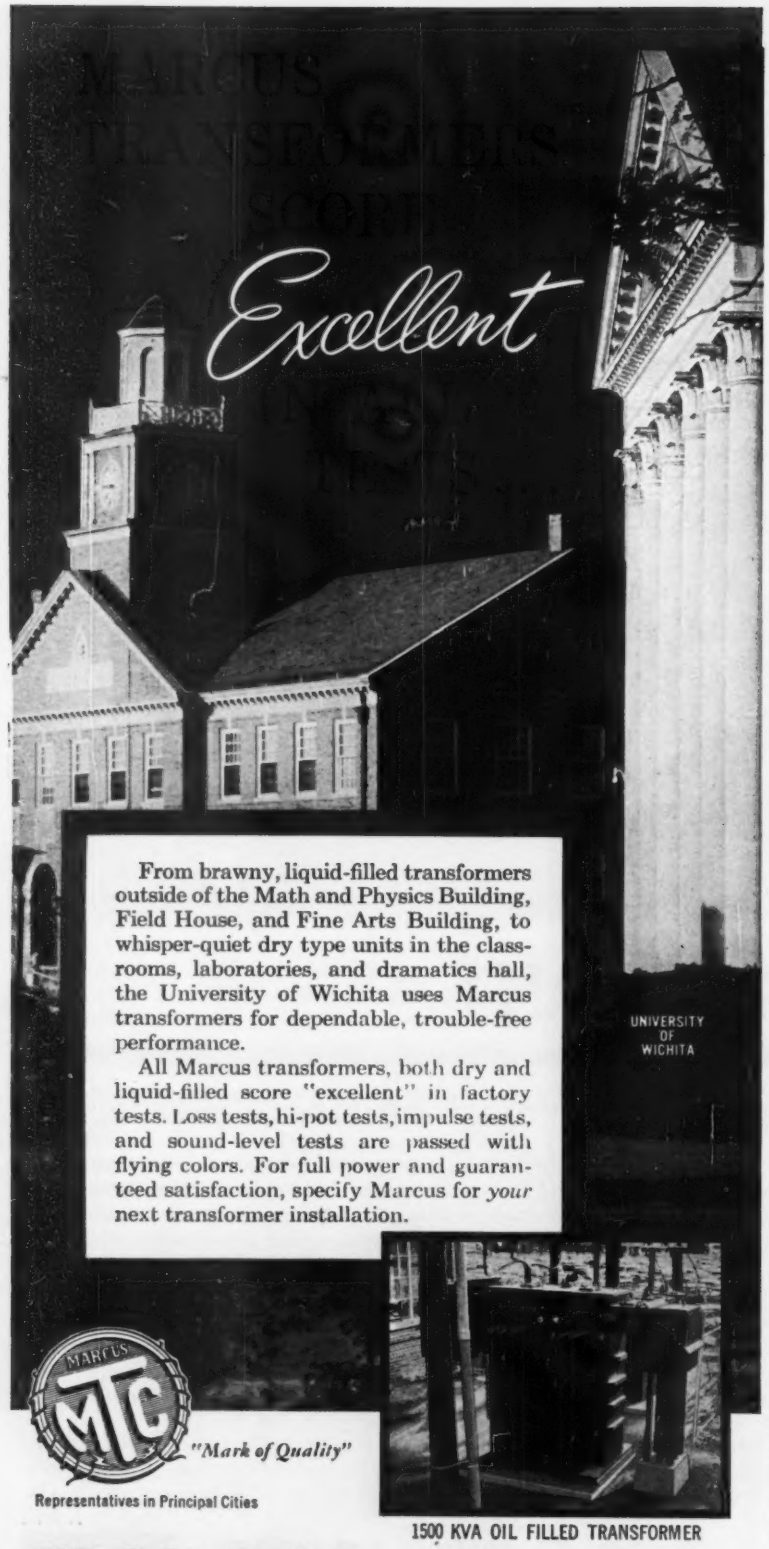
A-164-2

Instruments, controls, and systems

BAILEY METER COMPANY

1060 IVANHOE ROAD • CLEVELAND 10, OHIO

In Canada—Bailey Meter Company Limited, Montreal



From brawny, liquid-filled transformers outside of the Math and Physics Building, Field House, and Fine Arts Building, to whisper-quiet dry type units in the classrooms, laboratories, and dramatics hall, the University of Wichita uses Marcus transformers for dependable, trouble-free performance.

All Marcus transformers, both dry and liquid-filled score "excellent" in factory tests. Loss tests, hi-pot tests, impulse tests, and sound-level tests are passed with flying colors. For full power and guaranteed satisfaction, specify Marcus for *your* next transformer installation.

1500 KVA OIL FILLED TRANSFORMER

MARCUS MTC "Mark of Quality"

Representatives in Principal Cities

MARCUS TRANSFORMER CO., Inc.

RAHWAY, NEW JERSEY

A COMPLETE LINE OF DRY TYPE AND LIQUID-FILLED TRANSFORMERS THRU 5000 KVA

burgh, had been selected to assist the nuclear power department (Washington) with architectural services. Construction is to start within a year.

Sweden Studying 250-Mw Atomic Plant

Sweden has begun initial studies on the feasibility of building a 250-Mw atomic power plant in that country. Westinghouse Electric International Co has announced that it has entered into an agreement with A. Johnson Co of Stockholm and the Bechtel Corp of San Francisco, Calif., to conduct a joint technical study (for AB Atomenergi), the Swedish atomic energy authority.

The project is said to involve evaluation of a homogenized pressurized heavy water reactor with a capacity of 250 Mw. It forms part of the Swedish atomic energy authority's program for 1961.

Scheduled to be completed in eight months, the study will be carried out simultaneously in Pittsburgh, Pa., and San Francisco. A team of eight Swedish engineers and physicists—four from the atomic energy authority and four from A. Johnson Co—will be in the United States for the duration of the study. Six of the group have arrived and the other two are expected soon.

'Butt-Fusion' of Polyethylene Pipe Promises New Utility Applications

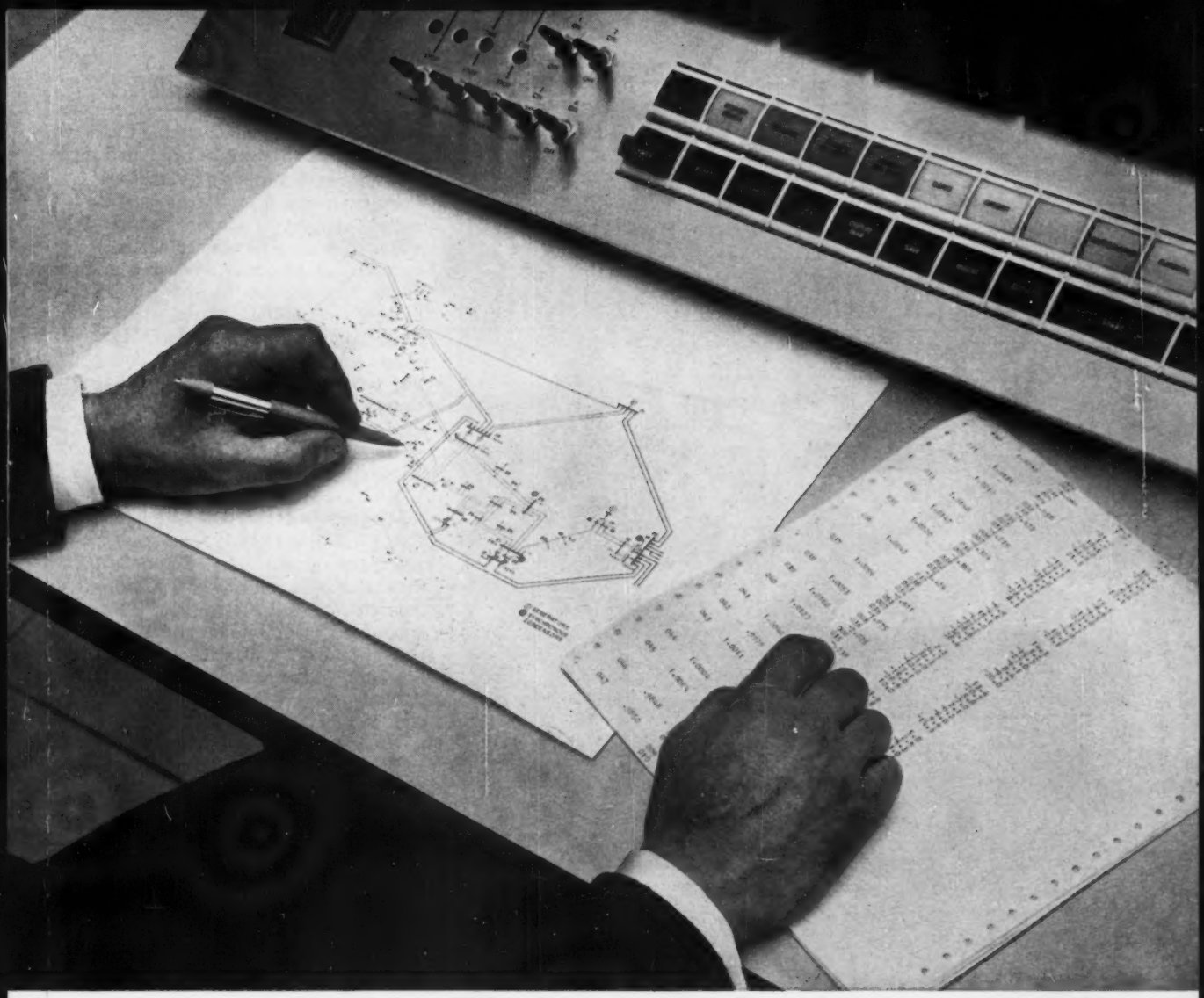
Emergence of a "butt-fusion" technique for easy, in-the-field joining of high density polyethylene pipe was announced today as a major advance in broadening utility applications of plastic pipe.

The new approach to joining lengths of plastic pipe is reported to be relatively simple.

Lightweight, high-density polyethylene pipe is non-corrosive, tough and durable; and is available in sizes from ½ to 10 in. in dia.

Underground cable, using the polyethylene pipe for conduit has been installed at Oklahoma Gas & Electric Co, Oklahoma City, Oklahoma, and Kansas Gas & Electric Co, Wichita, Kans.

(*More News of Manufacturers, p* 88)



Solve load flow studies in minutes with the low-cost IBM 1620

Now you can solve your system base case (up to 150 buses and 240 lines) in less than an hour... additional cases in minutes.

How? With the new Load Flow Program* for the IBM 1620 Data Processing System.

You simply enter the scheduled power input and voltage magnitude—or real and reactive loads at the terminals into the computer.

Your solid state 1620 automatically computes—and prints out fully or selectively—complete data on: *Voltage and angle* • *Net power* • *Load and generation* • *Line flows.*

You get direct entry to the base case for changes in loads, generation, transformer taps and capacitors. You can interrupt computation at any time to evaluate progress. And, because your 1620 produces complete data on cards or tape, you can run supplementary system studies at any time without having to solve the base case again.

Your local IBM Representative can give you all the facts. Call him.

*The IBM 1620 Load Flow Program is only one of many from IBM's extensive Program Library that now includes FORTRAN and GOTRAN. These free programs help you solve utility engineering design, system planning and operating problems, with a minimum of programming.

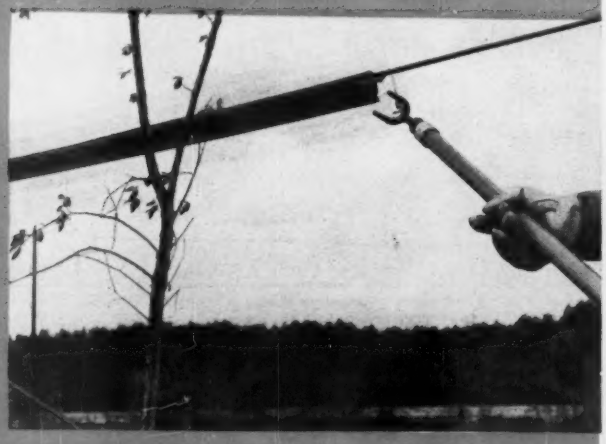
The IBM 1620 is a compact desk-size computer.

IBM®
DATA PROCESSING

New **Hendrix**

LINE-DUC PREVENTS CONDUCTOR INSULATION ABRASION

Easy installation with hot stick tool.



Anchor tie quickly made with hot stick tool.

Easy, quick to install Clip-on feature of this first practical lineguard makes installations easy and speedy with Standard Hot Stick Tools on open distribution conductors or readily installed on cabled service drops and communication cables.

Highly Abrasion Resistant Made of a new high density, track resistant, Polyethylene, the Line-Duc eliminates abrasion by foreign objects, reduces tree-trimming and costly conductor replacements. Provides insulation values up to 15 Kv nominal line voltages. Shipped in standard package consisting of 30-8 ft. lengths.

Write for complete illustrated details of the new Hendrix Clip-On Line-Duc

Hendrix **WIRE & CABLE CORP.**
Milford, N.H. Tel: Milford 1040

MANUFACTURERS OF **HENDRIX** AERIAL CABLES — HIGH VOLTAGE SPACERS, SECONDARY VOLTAGE SPACERS, "DEVIL'S CLAW" THERMO-CUTTER

MANUFACTURERS BRIEFS

• **Allis-Chalmers Manufacturing Co, Consolidated Systems Corp,** and **International Business Machines Corp** have signed an agreement of mutual support in the engineering and marketing of automated control systems and processes. When it is in the best interests of a customer to have a coordinated system, the three companies will direct their efforts toward "total industrial control systems." A typical integrated system would utilize A-C's basic industrial equipment, CS's special instrumentation and IBM's data-processing equipment.

• **Minneapolis-Honeywell Regulator Co's** Electronic Data Processing division has opened a new Computer Service Bureau at division headquarters in Wellesley, Mass., and announced plans for establishing a second bureau at the University of Southern California in August. The Wellesley service bureau, equipped with a Honeywell 800 EDP system, is located in the firm's Marketing and Education Center. The bureau also will be equipped with a Honeywell 400 system early next year.

The immediate objective of the new bureaus is to provide Honeywell EDP customers with strategically located facilities for pre-delivery checkout of their computer programs, personnel training and data-processing time for emergency use.

• **Riverside-Alloy Metal Div,** H. K. Porter Co, Inc, recently opened a new West Coast district office. The territory includes California, Oregon and Washington. Offices for the newly-activated district will be maintained at Porter's products distribution center in Los Angeles.

• **Epsco, Inc,** Cambridge, Mass., announced today that the **Radio Corp of America** has been granted a license, giving RCA rights to manufacture, use, and sell products covered by several patents owned or controlled by Epsco in the field of analog/digital data conversion. Epsco has pioneered in this field.

Analog/digital converters covered by this license have broad applications in the fields of industrial process control, process monitoring and automatic checkout, and in high-speed digital data transmission.

cut costs with service-proved GC breakers

When the new Westinghouse GC Single Tank Three Phase Power Circuit Breakers (rated 14.4 kv; 100, 250 and 500 mva) were first introduced, tests indicated that they would provide greater protection and require less maintenance and installation cost than the superceded type G breakers. Actual service records now verify these predictions.

Three key features make this performance possible.

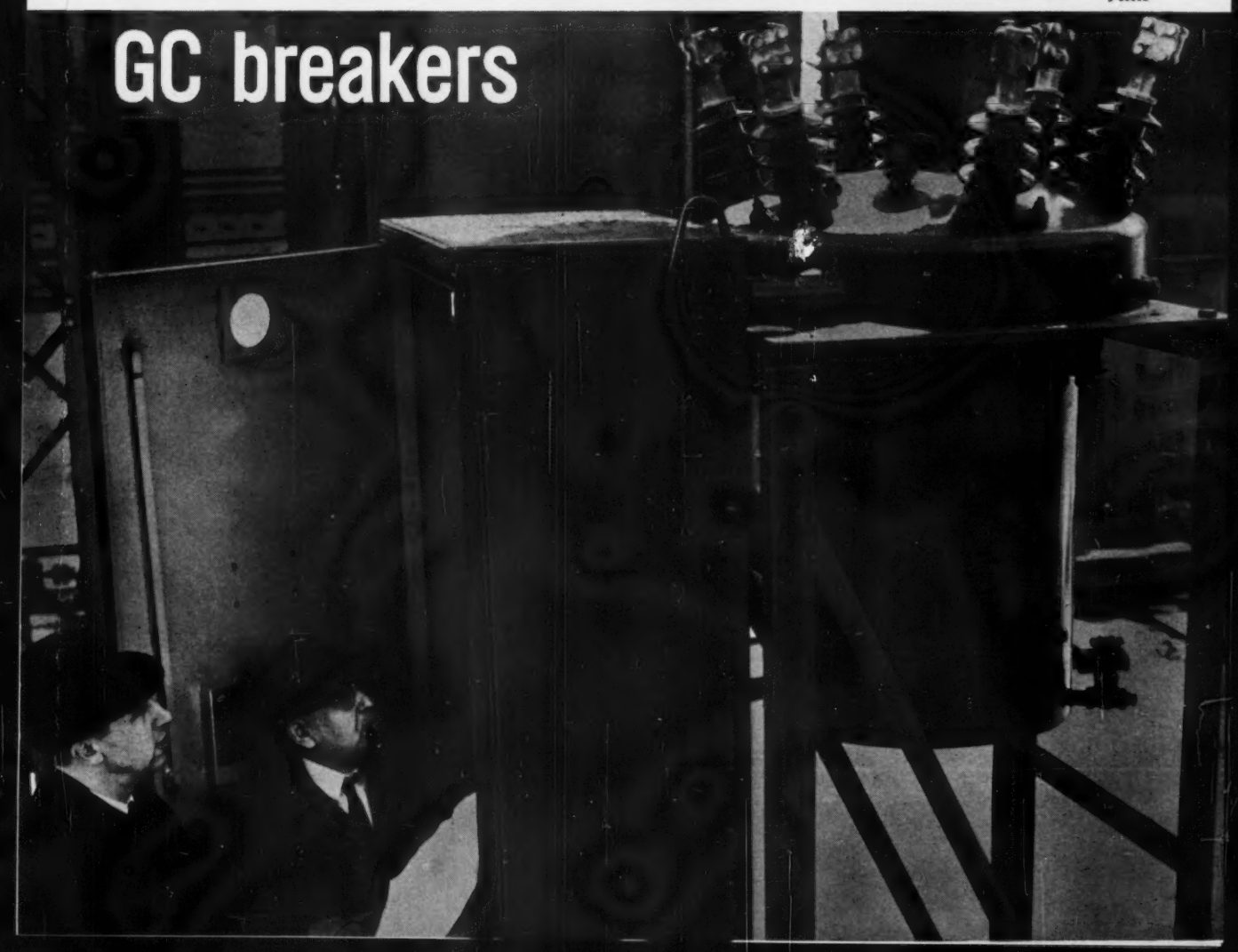
First, these GC breakers interrupt essentially within three cycles, from 0 to 100% of rating. This provides greater protection against line and equipment damage due to faults—reduces possibility of line burndown. It also reduces arcing time within the breaker which results in less contact burning and oil contamination and, therefore, less maintenance.

Second, simple solenoid operating mechanism minimizes maintenance.

Third, closing current requirements have been slashed to less than one-half compared to units available as recently as three years ago. Result here is lower installation costs since much smaller control cables and transformers or batteries can be used.

For complete facts, call your Westinghouse representative, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. *You can be sure . . . if it's*

Westinghouse



J. M. Kadetsky (right) of Pennsylvania Electric Company and T. C. Pitzer, Westinghouse Sales Engineer, discuss a 14.4 kv, 100 mva, GC Breaker. A good performance record has been logged by this unit installed in Pennsylvania Electric's Boulevard Substation, Johnstown, Pa.

J-61012

Arc Chute Provides Cutout Load Break

A. J. FINK, Manager, Cutouts & Fuses, Distribution Apparatus Dept, Westinghouse Electric Corp, Bloomington, Ind.

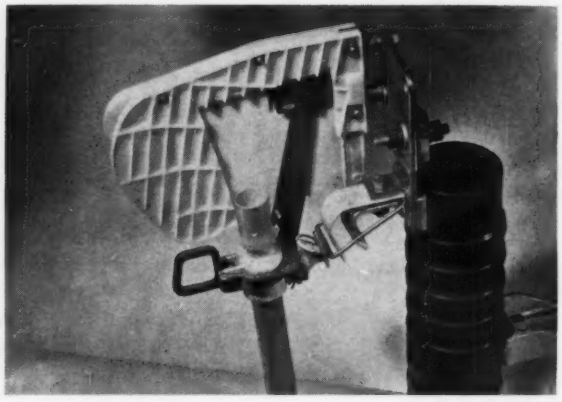
A cutout design featuring an arc chute provides a simple and inexpensive built-in load break that can operate repeatedly for the life of the cutout without maintenance or replacement of parts. It requires no special tools and is safe for linemen to operate with an ordinary hookstick without danger of flash burns.

Load current is normally carried through the main contacts of the cutout. Parallel with these contacts is a quick-break blade and another set of contacts that is located within the arc chute.

Similar arc chutes have been used for years for indoor load-break devices. With development of a new chute material, Delrin acetal resin, which has excellent electrical and weather-resistant characteristics, the arc chute can be used outdoors. The material is non-tracking, produces de-ionizing gas under arcing conditions, has high impact strength and excellent resistance to moisture and temperature.

The cutout is opened by pulling down on the rotating hook eye and unlatching the main contacts. Current is then carried entirely through the quick-break blade. As the operator continues to open the cutout, the quick-break blade is cocked against its stationary contact in the arc chute.

A coil spring at the bottom of the blade is tightened to provide energy for a snap opening. The cutout is opened to a point where the arc cannot possibly restrike across the main contacts of the cutout. The quick-break blade then snaps open, drawing an arc the length of the chute. De-ionizing gas is generated from the arc heat, extinguishing the arc and interrupting load. The quick-break snap action is not dependent on the method of opening the cutout. The coil spring provides all opening energy required.



LOAD-BREAK CUTOUT with main contacts half-open shows quick-break blade in contact. Snap action cannot occur until main contacts separate enough to prevent restrike

When the lineman manually recloses the cutout, the blade is free to travel through the split contacts in the arc chute. The main contacts engage after the blade makes contact. This frees the cutout's main contact of burning and pitting due to pre-strikes and increases cutout life.

No appreciable erosion of the inner surface of the arc chute is noticeable after more than 200 operations at full interrupting rating. Erosion of the blade and contacts does not affect operation as these parts carry current only during the opening of the cutout. Increased contact resistance helps arc interruption.

Load break ratings cover the entire range up to the maximum continuous current rating of the device as either a cutout or as a 200-amp load break disconnect and also at low power factors not normally encountered. Because of the snap action it is also an ideal device for switching large banks of capacitors.

Load Break Cutout Interrupting Ratings

Voltage	— Fault — 7.8-kv [1] Solid Cap	Exp. Cap	15.0-kv [1] Solid Cap	Exp. Cap	— Load — Load Current [2]	Transf Mag. Kva 3-Phase [3]	Capacitor Bank Kvar 3-Phase [3]
Heavy Duty	5,000	10,000	4,000	8,000	100	2,500	1,500
Extra Heavy Duty	10,000	20,000	8,000	16,000	100	2,500	1,500
Disconnect	—		—		200	2,500	1,500

[1] Ratings in RMS asymmetrical amp.
[2] Ratings in RMS symmetrical amp, 70% min. power factor.
[3] Effective at 7,200 /12,470 volts.

call GraybaR for everything electrical

FOR VOLTAGES OF 600 OR LESS

There's a *Safe and Dependable* BUSS Fuse or FUSETRON Fuse to fit the needs of every user...

...AND FUSES PROVIDE THE HIGHEST DEGREE OF PROTECTION AVAILABLE

A fuse is just as safe and accurate 20 years or longer after installation as it is on the day installed. A fuse can provide high interrupting capacity at a very low cost to protect against today's high available fault currents. It can limit let-thru fault currents to exceptionally low values. A fuse can have long time-lag to prevent needless shut-downs.

Buss LOW-PEAK Fuses
200,000 amp. interrupting capacity . . . great current limitation . . . plus long time-lag.
Ask for Bulletin LPCS

FUSETRON dual-element Fuses
All purpose protective device for circuit, motor or equipment protection.
Ask for Bulletin FIS

Buss Hi-Cap Fuses
For loads above 600 and up to 6,000 amps. 200,000 amp. interrupting capacity, —plus current limitation.
Ask for Bulletin HCS

Buss LIMITRON Fuses
High interrupting capacity fuses with exceptional current limitation.
Ask for Bulletin HLS

BUSS makes a complete line of fuses for home, farm, commercial, electronic, electrical, automotive and industrial use.

661

GraybaR stocks save you

Buss Super-Lag Renewable Fuses
Lowest cost protection where periodic short-circuits are frequent.
Ask for Bulletin RCS
Buss One-Time Fuses
Low cost, safe protection for heating or lighting circuits where faults do not exceed 10,000 amp.
Ask for Bulletin NCS
Buss Clear Window Plug Fuses
One piece body and "safety" design guarantee protection.
Ask for Bulletin WUS
Buss FUSTAT Fuses
Fusetron fuses with Type "S" base resist overfuseing or tampering.
Ask for Bulletin SCPS
Fustats for motor protection.
Ask for Bulletin SMPS
FUSETRON dual-element Plug Fuses
Safely stop needless blows. Give full protection against short-circuits and overloads.
Ask for Bulletin TCPS
BUSS and FUSETRON Small Dimension Fuses and Fuseholders
For the protection of all types of electric and electronic devices.
Ask for Bulletin SFB
Get the Facts... write
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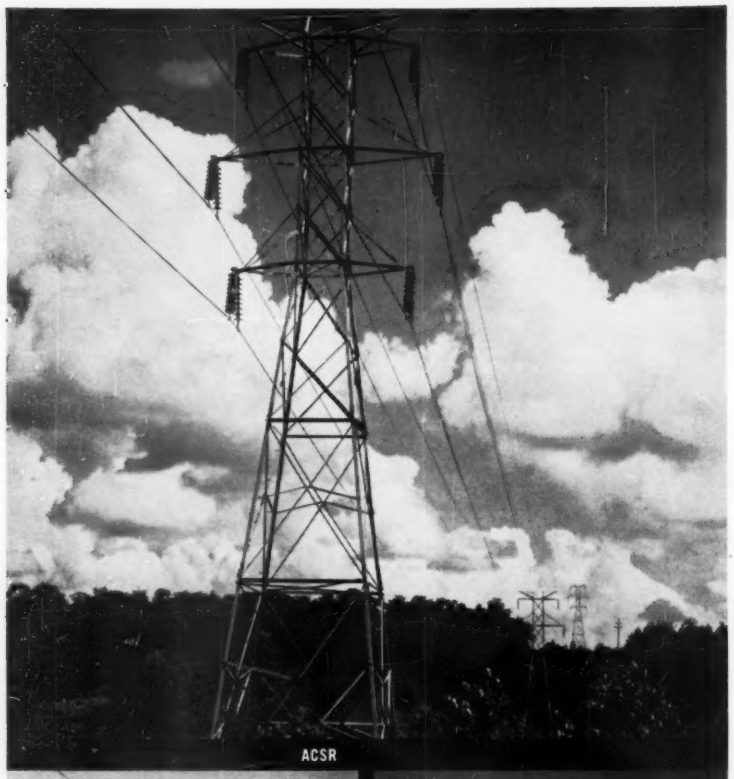
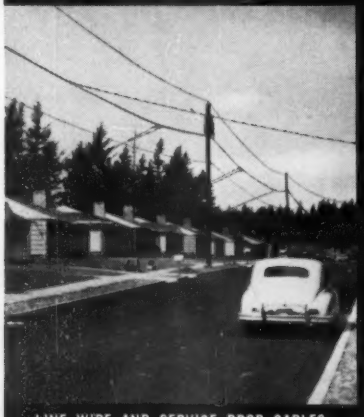
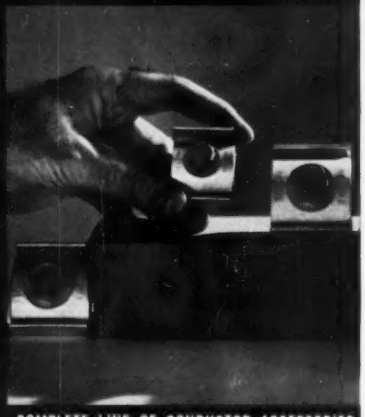
the cost of possession



ACSR



LINE WIRE AND SERVICE DROP CABLES



COMPLETE LINE OF CONDUCTOR ACCESSORIES

ALUMINUM ELECTRICAL RIGID CONDUIT

TOOLS FOR APPLYING ACCESSORIES

1

one-stop shopping for ALCOA aluminum

When you specify Alcoa® aluminum, you're sure of meeting all your needs—conduit, ACSR, line wire and service drop cables, accessories and tools.

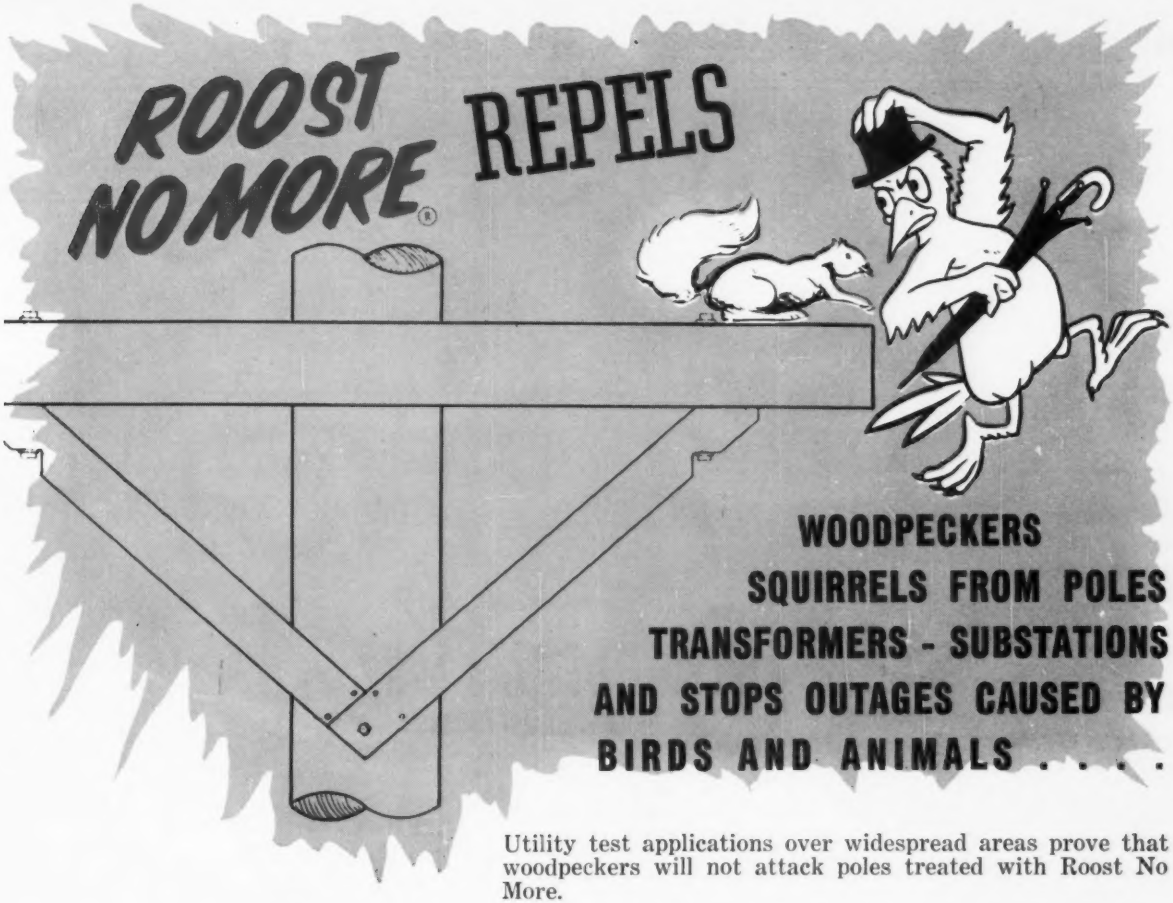
And Graybar provides the added convenience of a single source. Here's one-stop shopping, a single source with undivided responsibility. Result? You get precisely what you need, when and where you need it.

So remember: Alcoa *is* aluminum. And Graybar is your most convenient source.

ALCOA
ROME CABLE
DIVISION

GraybaR stocks save you

ROOST NO MORE® REPELS



WOODPECKERS
SQUIRRELS FROM POLES
TRANSFORMERS - SUBSTATIONS
AND STOPS OUTAGES CAUSED BY
BIRDS AND ANIMALS . . . .

Utility test applications over widespread areas prove that woodpeckers will not attack poles treated with Roost No More.

A safe chemical compound that gives animals and birds the real "hot foot" but doesn't hurt them . . . just keeps them away.

Harmless to trees, shrubs, vines and other vegetation.

Compounded with high dielectric properties for use on or near energized electrical equipment.

Widely used on many state capitol buildings, city buildings, government agencies and power companies. Approved by REA.

Recommended application: 1/16-in. minimum thickness, easily applied by spray or brush. One gallon covers about 200 sq. ft. Available in 1-gal. cans (4 per case, weight 34 lbs.); 5-gal. cans (43 lbs.); and 55-gal. drum (450 lbs.).

THE ANSWER to a major problem of some utilities. Complete application information, technical data and prices available on request.

AMERICAN · CROSSARM
AND CONDUIT COMPANY

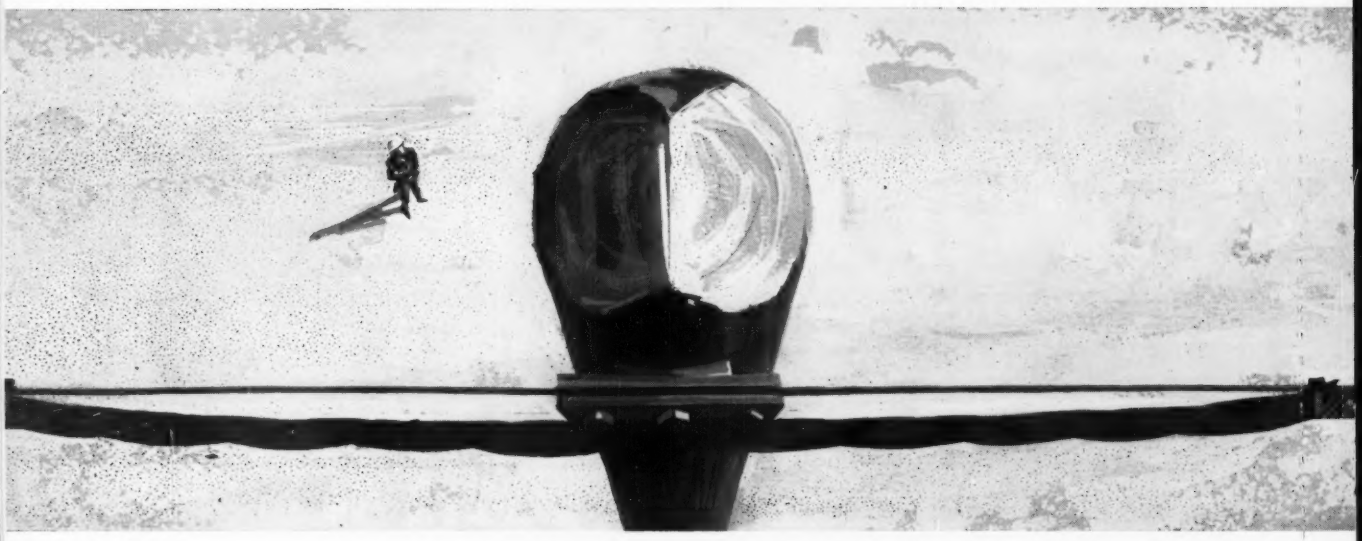
GENERAL OFFICES
7726 SHERIDAN ROAD
CHICAGO 26

FACTORIES
KANSAS CITY, MO.
SCHILLER PARK, ILL.
MINNEAPOLIS, MINN.
DANVILLE, PA.
CHEHALIS, WASH.
GAINESVILLE, FLA.

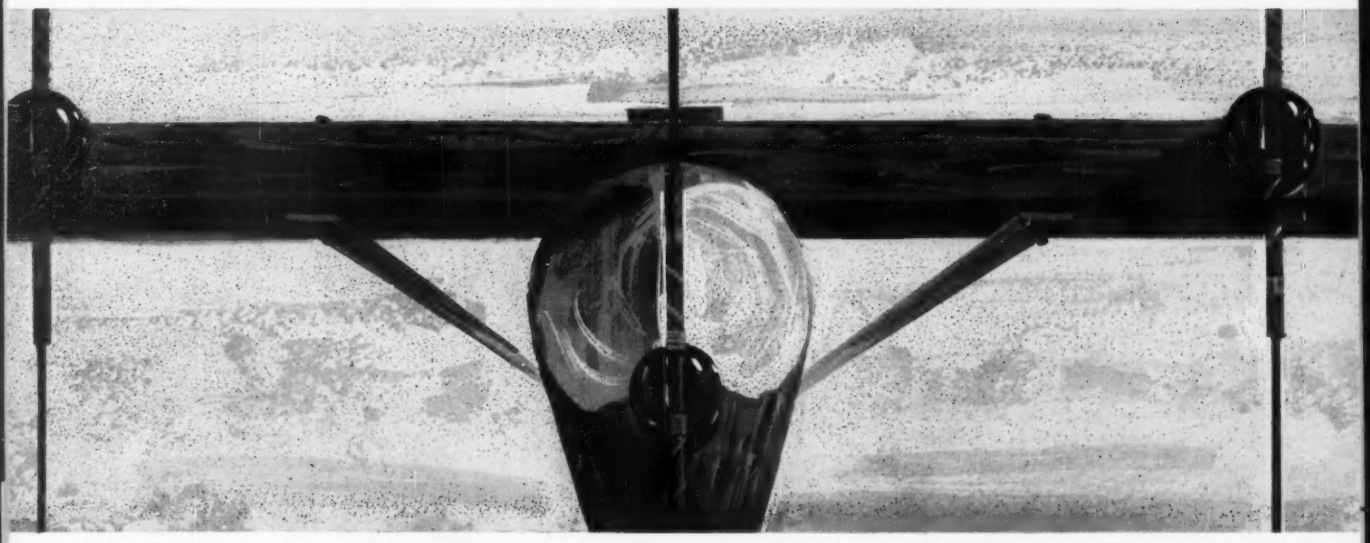
Distributed by GraybaR ELECTRIC COMPANY

the cost of possession

Hang it this way—



instead of this way—



and cut costs with Anaconda Self-Supporting Aerial Cable

Anaconda self-supporting aerial cable takes up less room wherever it's used. No crossarms needed—because it's attached directly to the pole. That means right of way charges go way down. It also means you can cut tree-trimming expenses by more than a half. The savings on tree-trimming alone may more than justify the cost of aerial cable.

Close configuration of the cable gives better voltage regulation because of balanced low reactance. There are fewer complaints about TV interference, because conductors are insulated and lashed together. The whole installation has a neater appearance because of unit assembly, even for three-phase circuits.

For complete information about Anaconda self-supporting aerial cable, contact Anaconda Wire and Cable Company, 25 Broadway, New York 4, New York. Department, EFL-1-EW.

61262

ASK THE MAN FROM
ANACONDA®
FOR SELF-SUPPORTING AERIAL CABLE

GraybaR stocks save you

DON'T HAND HIM A LINE unless it's American Brand Floterope®

This amazing new polypropylene rope will insure his safety, increase operating efficiency and greatly reduce all installation and maintenance costs.

Compare a ¾" diameter FLOTEROPE with a manila line of equal size. Though the synthetic rope is 30% lighter in weight it is 78% stronger. Because FLOTEROPE will outlast manila by far, its cost per operating day is always much less.

But that isn't all – FLOTEROPE is waterproof, will not freeze, resists rot, mildew and chemical attack. It is an excellent insulator because of its low dielectric loss, has less stretch and is so flexible and easy to handle.

In addition to FLOTEROPE, American offers other ropes especially constructed for utility use in natural and synthetic fibers . . . for hand lines, guy ropes, pole, safety and catenary lines and for hoisting and rigging.

FREE — Send for your handy pocket-size booklet showing weight and strength charts for all natural and synthetic ropes in sizes from 3/16" to 4" in diameter.

AMCO

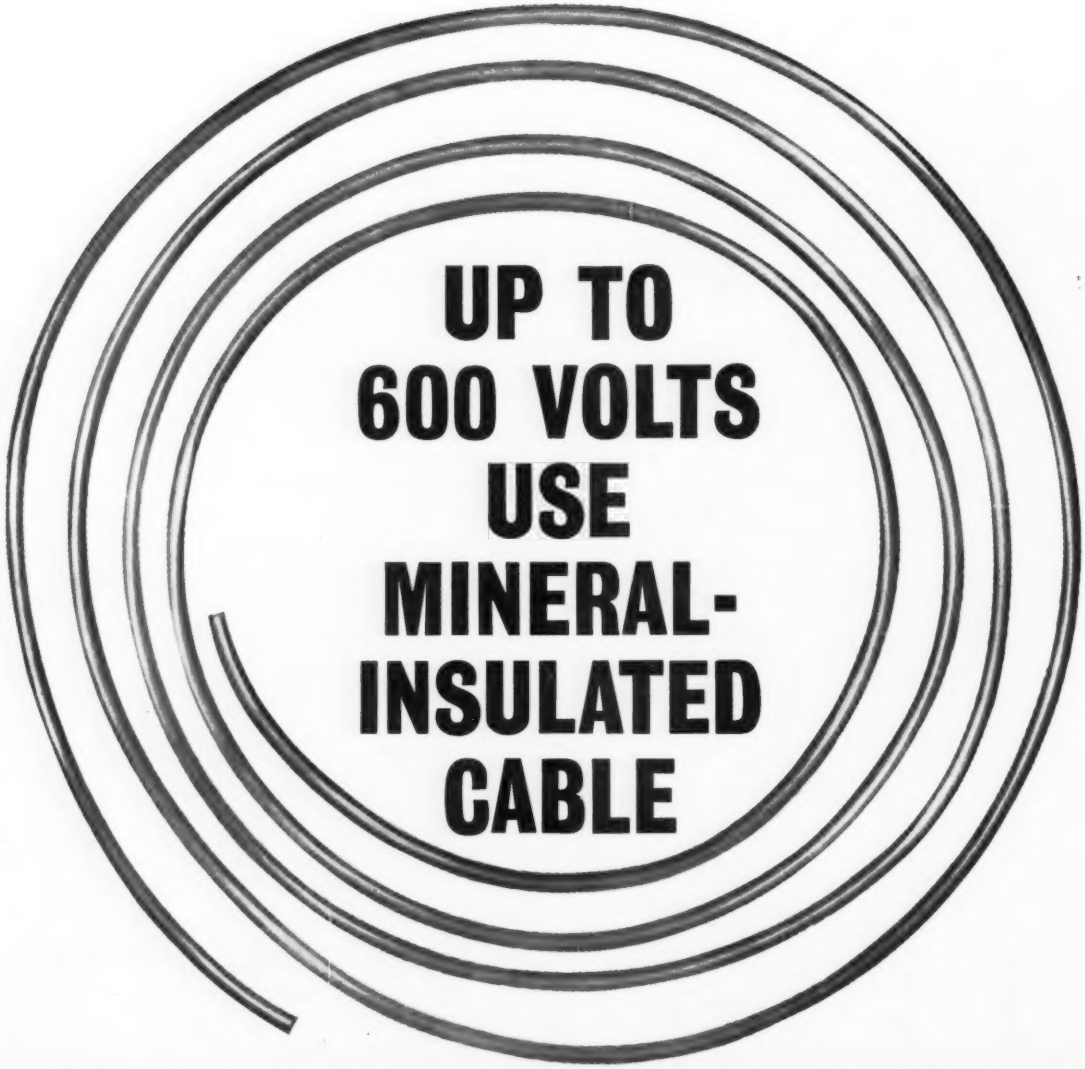
AMERICAN
MANUFACTURING COMPANY, INC.
Noble & West Streets • Brooklyn 22, N. Y.

Western Mill
ST. LOUIS CORDAGE MILLS
Eleventh & Lafayette Streets
St. Louis 4, Mo.

ROPE TWINE OAKUM PACKING

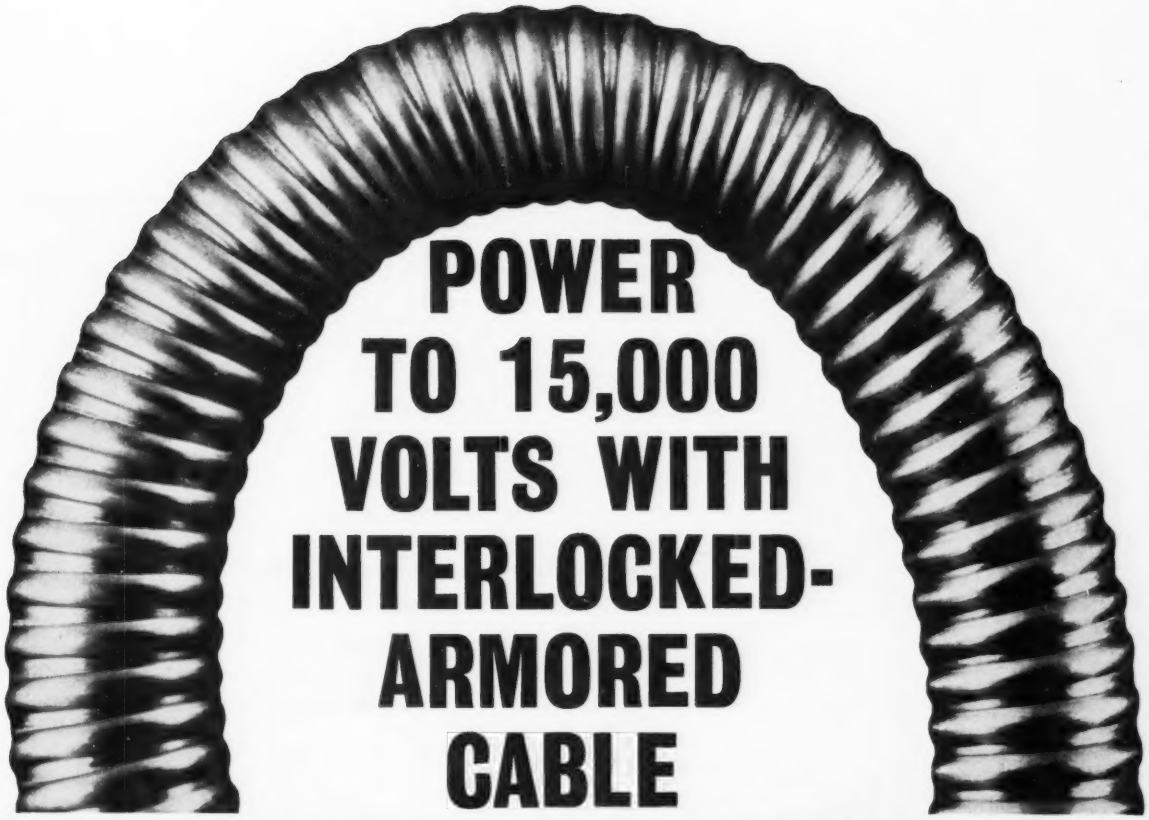
Sales Offices BOSTON CHICAGO HOUSTON NEW ORLEANS PHILADELPHIA SAN FRANCISCO

the cost of possession



MI Cable, too, is flexible and needs no conduit for installation. MI's conductors are insulated with refactory mineral insulation, and protected by a seamless gas tight, liquid tight copper sheath. There's no danger from moisture, vapor, or heat with MI! ■ An MI Cable job goes in fast, yet meets the highest possible standards of safety and long life. For up-to-600-volt jobs, you can't beat MI Cable.

GraybaR stocks save you



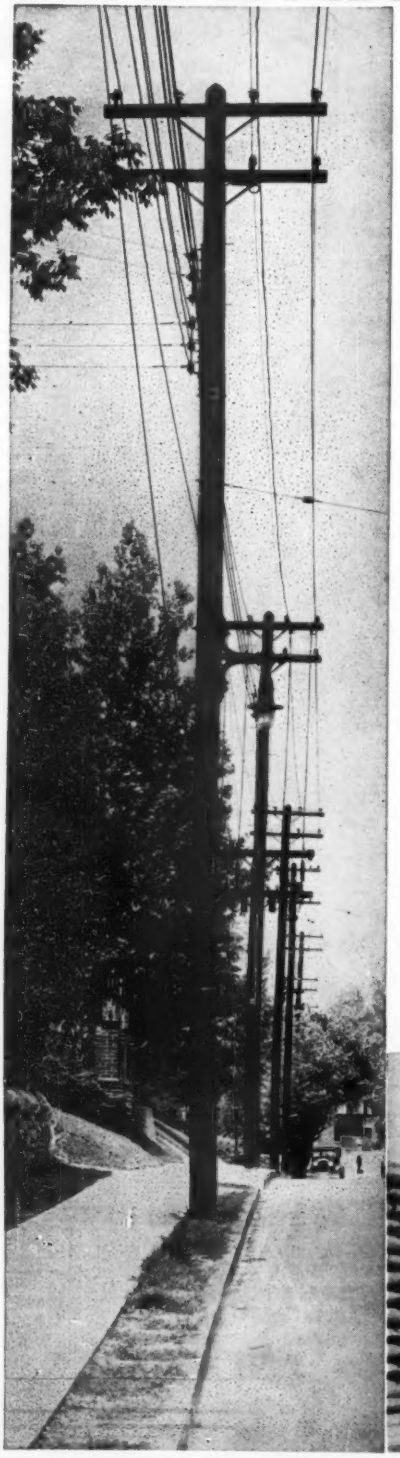
Protect your power cable with Interlocked-Armor, indoors or out... for any above ground installation. Interlocked-Armored Cable is flexible and the contractor installs it without conduit or pullboxes. For service up to 15,000 volts—specify General Cable Interlocked-Armored Cable.

■ **Be sure you get quality, economy and flexibility in your cable installations. Have your electrician or contractor specify Interlocked-Armored and MI Cable by General Cable Corporation, 730 Third Avenue, New York 17, N.Y.**

GCC
GENERAL CABLE CORPORATION

the cost of possession

DEPENDABLE



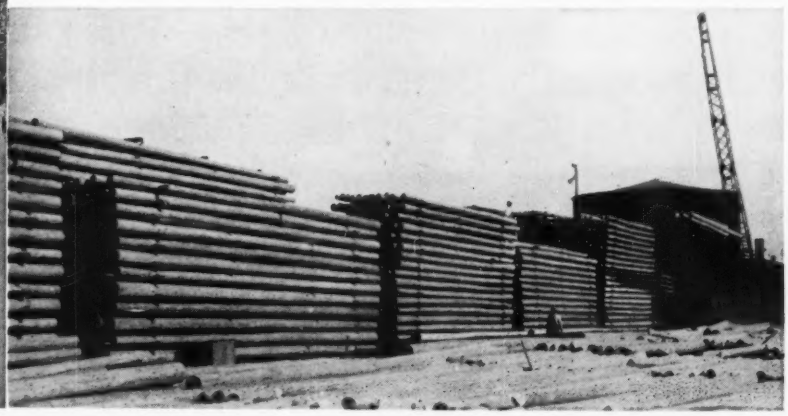
Poles

of
Selected Sound Timber
Scientifically Treated

THE lasting strength of International Creosoted Pine Poles plus their low ultimate cost makes them the safest and most economical poles that can be purchased. For more than 86 years, numerous service records of pole treatments have been utilized to perfect the present production practices for International Creosoted Poles. As a result of the lessons learned during this long experience, International Creosoted Poles will assure trouble-free, continuous service. Their straight, clean, smooth surfaces perfectly adapt them for street lighting, rural and urban distribution.

International Creosoted Pine Poles are manufactured and distributed by two of the oldest companies serving the utility industry. They have grown up together, ready always to serve with quality poles, framed correctly, and shipped when needed.

GraybaR Distributed by GraybaR



INTERNATIONAL CREOSOTING & CONSTRUCTION CO.

PRODUCERS OF HIGH GRADE TREATED TIES, POLES, PILES, ETC.

Galveston — Beaumont — Texarkana

GraybaR stocks save you

SPECIFY CHANCE From Graybar

MECHANIZE SCREW ANCHOR INSTALLATION

Use your power hole-digging equipment to install Chance Screw Anchors in 5 to 8 man-minutes . . . *from the time the equipment is moved into place until the anchor is ready for the guy.*

Chance Power Installed Screw Anchors, ranging from 78 to 176 square inches in area, go down fast into all types of soil (except extremely rocky soil). The sharp cutting helix of high-strength structural steel is tapered to minimize earth disturbance. Hundreds of installations and pull tests prove these anchors hold more with less creep than any anchors of comparable size.

Your boring equipment can be easily adapted to power anchor installations by use of a special Chance wrench (right) which transmits torque from the power equipment directly to the hub on the anchor helix. Wrenches are made to fit all popular makes of earth borers. And, since the anchor rod is not subjected to torque, it only has to be heavy enough to support the guy load. That's a cost-saving factor. So, power-install Chance Screw Anchors, and get: lower installation costs per anchor • better utilization of expensive equipment • greater holding power with less creep • consistent results • elimination of human variables and error • less physical effort, better employee relations.

FOR "ALL 'ROUND" HOLDING POWER

CHANCE 8-way Expanding Anchors

It's not surprising that in every field test the Chance 8-way Expanding Anchor holds more than its rated load because its eight blades expand to form a pyramid shaped square—there is no wasted space between blades. The load is distributed evenly—all around the hole. It seems logical that it should hold more, and it does. That's why it's on so many company standards.

Available in sizes from 60 to 200 square inches in area, for distribution and transmission line guying.

THREE WAYS TO MAKE GOOD HOT LINE TAPS

Chance "P. C." AGP Tap Clamps for bi-metal connections or "P.C." AA for aluminum-to-aluminum

New Chance all aluminum tap clamps for heavy duty aluminum-to-aluminum taps in highly corrosive areas

Chance "P. C." CC Tap Clamps for copper-to-copper taps

CA60-25

A. B. CHANCE COMPANY

CENTRALIA, MISSOURI
(A. B. Chance Company of Canada, Ltd., Toronto)

ABC INDUSTRIES

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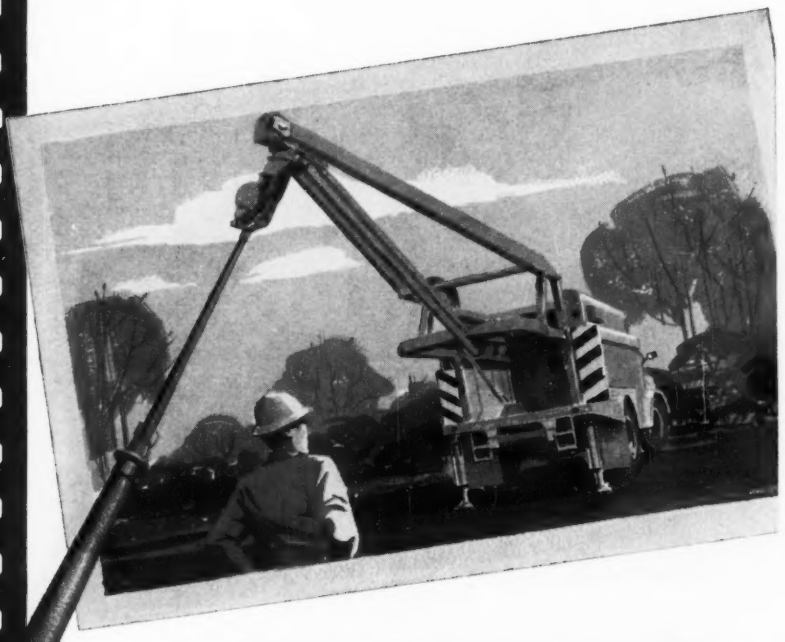
Why make a MOVIE?

when a SNAPSHOT will do!



A SINGLE OPERATION!

LESS LABOR • LESS TIME • LESS COST

Hubbard *PowerDrive* Anchors

...provide greater holding power, consistently dependable anchors because of minimum disturbance to soil during installation

BETTER PRODUCTS *through Creative Engineering*

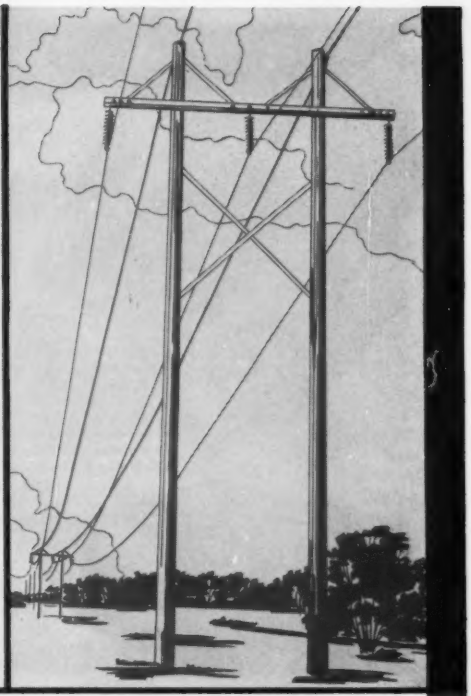
HUBBARD AND COMPANY
CHICAGO 50, ILLINOIS

GraybaR stocks save you

All Around Reliability

The ruggedness to resist the abuse encountered in construction, the ductility to make it easy to work and serve, the tensile strength to carry the required load, the ability to last... all are combined, *with economy*, in *Crapo* Galvanized Steel Strand.

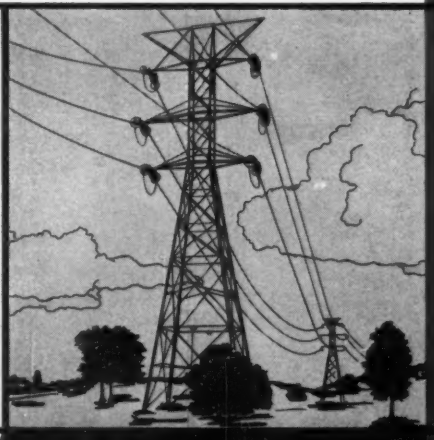
Proof of the reliability of *Crapo* Galvanized Steel Strand is contained in the records of leading utilities throughout the country. Case histories of overload lines will show that *Crapo* Galvanized Steel Strand used as static wire has given dependable service for 35 to 40 years or more.

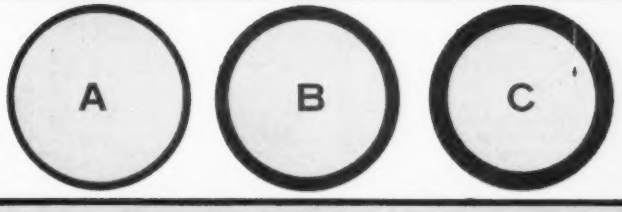


SPECIFY *Crapo* GALVANIZED STEEL STRAND

FIRST FOR OVERHEAD GROUND WIRE—GUYS—MESSENGER

The dependable performance of *Crapo* Galvanized Steel Strand over the years is directly traceable to vigilant laboratory control over its manufacture. The steel wires which go to make up the finished products are stress relieved by heat treatment at final size to improve ductility and to minimize stretch under tension. Each wire is protected against corrosion by a heavy uniform, tightly-bonded coating of commercially pure zinc. To facilitate cutting and serving and to prevent unraveling, the individual wires of the strand are *preformed*.





AVAILABLE IN 3 COATING WEIGHTS

When you specify Crapo Galvanized Steel Strand you can choose from three weights of coating: Class A, B or C. Class B Coating is twice as heavy as the standard Class A coating; Class C Coating is three times as heavy as "A."

SPECIALIZING IN STRAND FOR THE UTILITIES

For more than 50 years our engineering, manufacturing and testing facilities have been devoted to the production of high quality galvanized steel strand for the power and communication industries. If you have a problem involving the use of steel strand in overhead lines, ask your Graybar representative for technical information!

INDIANA

STEEL & WIRE CO., INC.

the cost of possession

201—famous Klein Side Cutting Plier. Sizes 5, 6, 7, 8 and 9 in.

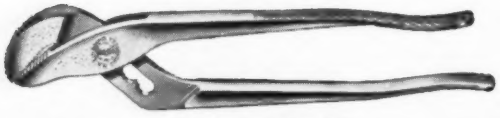
201-NE—rounded nose side cutting plier. Sizes 5, 6, 7, 8 and 9 in.

213-9NE—high leverage plier. Will cut regular and weatherproof hard drawn copper wire up to No. 2.

301—long nose plier. Available in 5-, 6- and 7-in. sizes. Also may be had with cutters.

202—narrow nose oblique cutting plier. Available in 5- and 6-in. sizes.

500—adjustable wrenches. 6, 8, 10, 12 in.



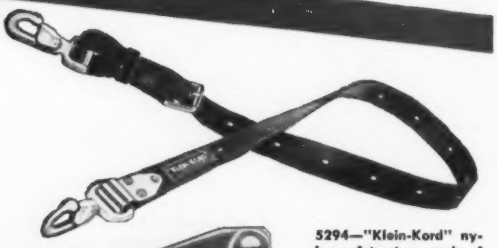
510—pump plier. One hand operation. Length, 9½ in.

KLEIN TOOLS
EST. 1857

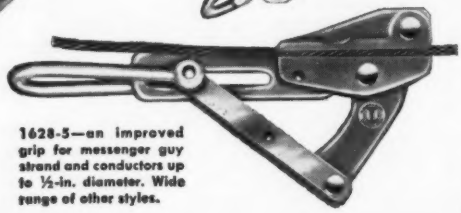
over a century of progress

Klein has been the leading supplier of tools and equipment to the electrical industry since the first wires were strung. It was over 100 years ago that Mathias Klein first opened his little forge shop in Chicago. Today the name Klein is known for quality the world over. From your Electrical Distributor, you can secure anything you need in tools and equipment for linemen and electricians. Below are a few of the popular Klein items available.

5249—linemen's belt. Full floating with "Klein-Kord" sliding trace. One of a complete line.



5294—"Klein-Kord" nylon safety strap made of multiple plies of strong, woven nylon bonded with frictioning and vulcanized in neoprene.



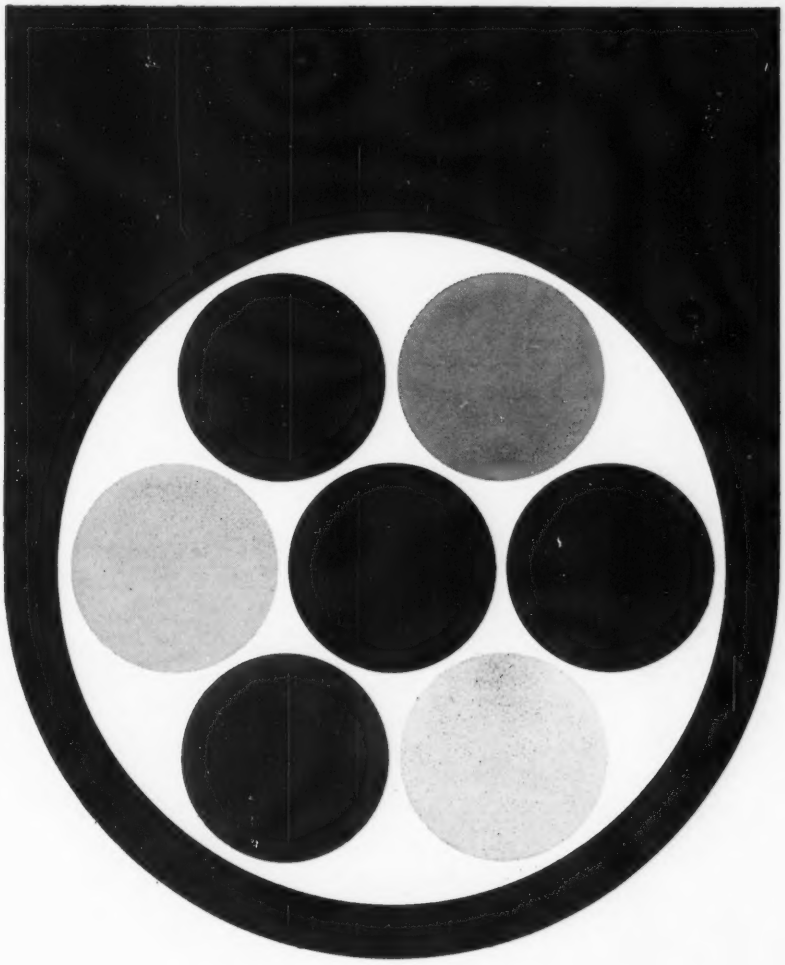
1628-5—an improved grip for messenger guy strand and conductors up to ½-in. diameter. Wide range of other styles.

1959-AR—replaceable Gaff climber; right and left, adjustable from 14½ to 19 in. Other designs available.

This new Klein Catalog is just off the press. A copy will be sent to anyone interested on request.

Mathias KLEIN & Sons
Established 1857 — Chicago, Ill., U.S.A.
INCORPORATED
7200 McCORMICK ROAD, CHICAGO 45, ILL.

GraybaR stocks save you



NEW "VALUE RATINGS" TELL YOU:

How good are K/W cables? Compared to industry standards . . .

KAISER POWER CABLES give you as much as 363% performance value—compared with 100% values of *IPCEA-NEMA test standards* for the types of insulation and jacketing used. K/W Grizzly® Spec. 831 earns a Value Rating of 270% on this basis. The emblem at right tells you at a glance how good this cable is. New K/W bulletin lists other ratings.

K/W GRIZZLY POWER CABLE SPEC. 831
VALUE 270% RATING

KAISER PORTABLE CORDS deliver as much as 308% *actual service per dollar* compared to typical low cost C.V. cord. Patented Laytex® insulation and fibrous core construction give K/W Master Laytex Spec. 920 as much as five times the life—can eliminate four out of five repairs. Its Value Rating shows its net value at purchase price now prevailing.

K/W MASTER LAYTEX PORTABLE CORD
VALUE 308% RATING

KAISER CONTROL CABLES earn Value Ratings as high as 767% when compared *to a composite of IPCEA test minimums* for eight important insulation qualities. K/W cables with patented Laytex insulation are the industry's finest. Many other K/W insulations—rubber and plastic—offer a wide choice of values. See their ratings in the K/W bulletin.

K/W LAYTEX-RESIN CONTROL CABLE
VALUE 767% RATING

Ask Graybar for free "Value Rating" Bulletins with details and ratings of Kaiser Wire constructions.

IN COPPER AND ALUMINUM CABLES . . . THE SPARK OF QUALITY IS KAISER WIRE EXPERIENCE KAISER ALUMINUM

the cost of possession

It Pays to have the Right Equipment

Distributed by GraybaR ELECTRIC COMPANY

Extension Ladders
Sectional Ladders
Carrying Hooks
Dipsticks
Peavies
Cant Hooks and Cant Hook Cant Hooks
Shovels
Digging Bars
Pike Poles
Pike Pole Guards
Pole Supports
Tamping Bars
Spoons
Rods
Hex Thimbles
V-Belt Pole Cradle
Ground Rod Tamping Bar
Grounding Clamps
Grounding Connectors

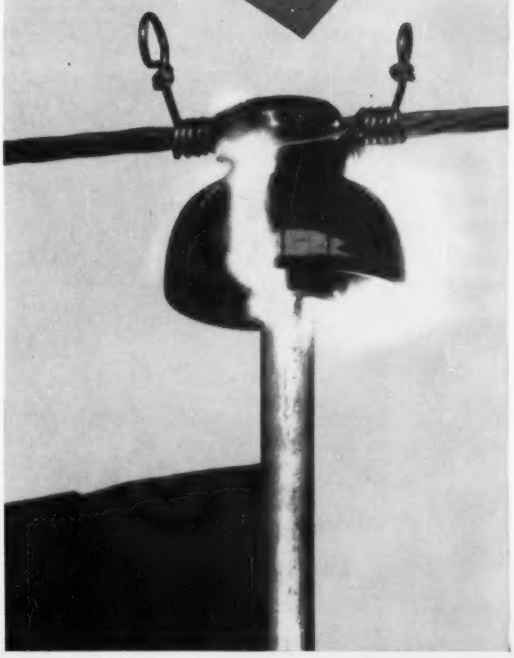
NEW PRODUCTS:
Skidding Tongs
Alley Arm Ladders
Combination Reels for Aluminum

OSHKOSH
POLE LINE TOOLS
BEACH COMPANY • OSHKOSH, WISCONSIN
Since 1887

GraybaR stocks save you

The big profit is yours ...not ours

Lightning-resistant design of O-B distribution pintypes avoids a high ...and often hidden... operating expense



"I never heard of lightning damage to one of our distribution insulators."

That's just the point -- you **may not** hear about it. Sometimes it is not recognized by repair crews. Sometimes it is not reported. Other times, the information does not travel as far as the Purchasing Department. Lightning damage to insulators is relatively infrequent -- and you can be thankful for that!

Such an occurrence, however -- just one -- can amount to a substantial percentage of the total cost of a large quantity of pintype insulators. Any "bargain" in such insulators would be wiped-out many times over. See the explanation of lightning-puncture.

Fine technical facilities, competent manufacture, and a desire to make even small pintypes deserving of the company's reputation, account for the distinctive O-B property of lightning-immunity, at no premium in price. The big profit is **yours**, not ours!

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass

HOLAN

Distributed by GraybaR ELECTRIC COMPANY

10137-H

WHAT IS LIGHTNING PUNCTURE?

When the dielectric strength of an insulator is weaker than that of the surrounding air, a steep-front lightning stroke may go through it rather than around it. Sometimes this results in shattering the porcelain; the cause often being reported as "unknown." Other times it produces puncture with the insulator still intact.

A lightning-punctured insulator is very difficult to discover. The condition consists of a hair-like hole usually running from a point under the conductor or tie-wire to the end of the pin. Both ends of this microscopic hole are concealed. In dry weather the insulator will often sustain voltage. Only when wet is electrical leakage a certainty. This may exhibit itself as a cause for pole fires, as a public hazard due to a "hot pole", and almost certainly as a repeated source of service interruptions. Adding-up numerous trouble calls, difficulty of locating the damaged unit, and final cost of replacement, a single lightning-punctured insulator can become a major item of expense.

O-B has one of the few laboratories in the world that can produce electrical discharges even more violent than natural lightning -- and the ONLY pintype insulator, to our knowledge, that will consistently withstand these discharges. These facilities, and the willingness to apply them to the development of a low cost insulator, are unique in the industry. The difference you will discover in O-B pintype insulators is not in size, not in shape, not even in published price. The difference is in rugged performance -- in the ability to save you the trouble and high expense of lightning damage.

the cost of possession

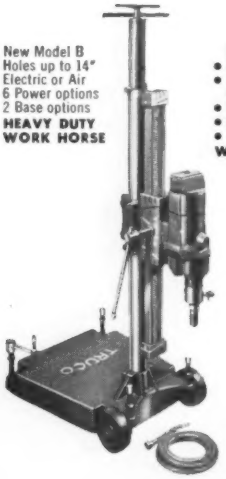
DRILL MASONRY FAST AT GREATEST SAVINGS

50, 60, 70% with NEW Truco® Portable Diamond Drilling Equipment

Truco Original Diamond Drill Bits revolutionized masonry drilling by proving savings up to 70%. Sizes ¼" through 20" O.D. Standard lengths 4½" and 12". Other sizes and lengths to order. Full line of accessories.

5 NEW MODELS PLUS POWER COMBINATIONS=16 MODELS

- Electric, air, gasoline power
- 10 NEW FEATURES of use, economy, performance
- Clean, accurate holes ¼" to 20"
- Roller base, or base plate or truck mounted models. Drill ANYWHERE
- Complete line of engineered, matched accessories
- World's cleanest, quietest, thriftiest hole drilling. No edge patching
- Truco equipment often pays for itself in a single day or on a single job



New Model B
- Holes up to 14"
- Electric or Air
- 6 Power options
- 2 Base options

HEAVY DUTY WORK HORSE

New Model A
- Holes up to 6½"
- Electric, Air or Gasoline
- 5 Power options
- 2 Base options
- Truck mount

WORLD'S MOST VERSATILE

New Model S Drill Stand and Hand Drill Motor
- Holes up to 5½"
- 3 Power options

LOW COST THRIFT CHAMP

Model G
- Holes up to 20"
- Electric, Air or Gasoline
- 8 Power options
- Wheeled base or Truck Mount

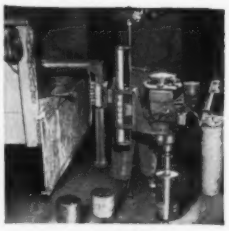
TRUCO'S MIGHTIEST

New Drill Kit
- Holes up to 1½"
- Wt. only 17½ lbs.

HANDY LITTLE DANDY

TRUCO® TRU-VAC VACUUM BASE

ANCHOR ANY DRILLING MACHINE IN SECONDS WITH TRU-VAC VACUUM BASE. Slips under base of practically any portable drilling machine, anchors instantly for accurate, high-speed drilling in reinforced concrete etc. No anchor holes in floor or walls; no jack to ceiling. Exerts approximately, 1000 actual pounds vacuum; instantly releases for rolling to next location and re-anchoring. Quickest set-up ever. Write for Bulletin SC-7.

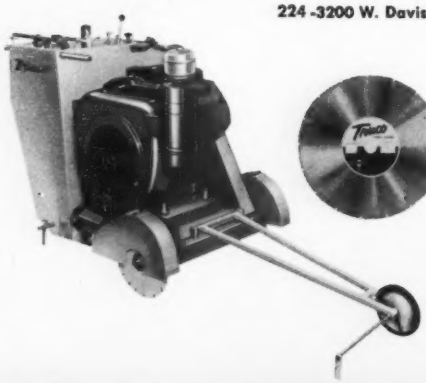


Truck mounted unit swings down into position for accurate, vertical drilling wherever a truck can go. Electric, air or gasoline power.

TRUCO MASONRY DRILLING DIVISION

WHEEL TRUEING TOOL CO.

224-3200 W. Davison Avenue • Detroit 38, Michigan

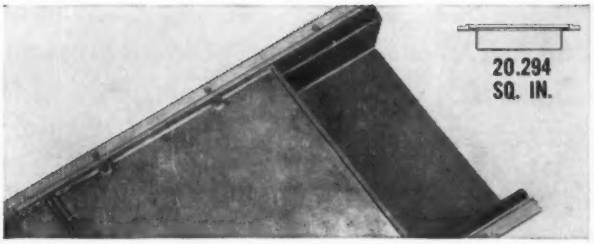


Blades and Saws

This sturdy line of heavy-duty equipment will save money on every job and give years of high-profit service. Models for every type of application; diamond and abrasive blades for every type of material. Write for literature.

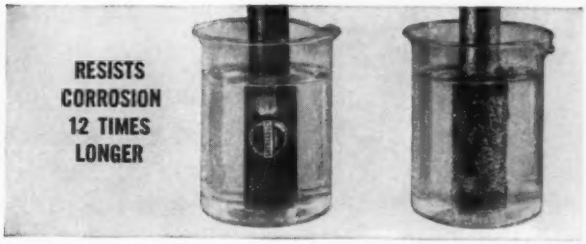
GraybaR stocks save you

National Electric is the best way to put power in place



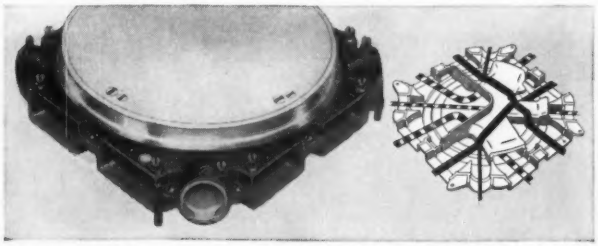
NEW! 15,000 SERIES HEADERDUCT

Largest available capacity. A full 20.294 square inches of wiring area. Provides 100% accessibility to any or all cells in cellular steel floors. Handles largest phone cables. A complete system for cellular floor construction.



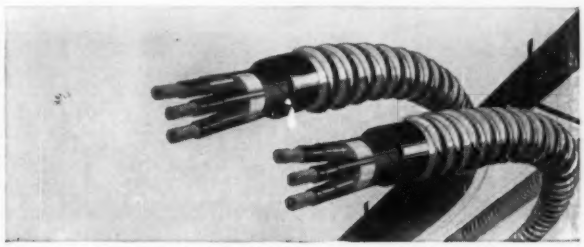
SHERARDUCT RIGID CONDUIT

Acid bath torture test proves superiority. Double protection: It's Sherardized (exclusive zinc process to galvanize in *depth*)! It's coated inside and out with MVC-1 (exclusive polyvinyl chloride resin that lasts and lasts)!



NEPCODUCT

New junction box is quickly brought into alignment with finished floor even after concrete has set. Leveling adjustment can be made with screwdriver without removing cover plate. Lazy susan interior partition can be relocated in case box should be inadvertently installed in incorrect position.



NEPCO-LOK INTERLOCKED ARMORED CABLE

Outstanding flexibility cuts installation costs. Installed quickly around corners and projections. Economically relocated for changing power needs of the future. 600-5,000 or 15,000 volt . . . one, two, three, four conductor and control cable assemblies.

NATIONAL ELECTRIC DIVISION PORTER **H.K. PORTER COMPANY, INC.**

the cost of possession

ROLL CALL!

Check The Record

☐ More miles in use underground than any other fibre conduit. ☐ oldest installations ☐ some go back 60 years and are still going strong. ☐ wide acceptance... ☐ by power and light utilities ☐ by telephone companies ☐ general contractors ☐ industry ☐ also by cities and municipalities ☐ first fibre conduit—we introduced it in 1893. ☐ first C. A. Conduit (coupling attached) ☐ first Klean-Kote for cleaner handling.

When anyone pays us the compliment of calling some other make of fibre conduit "orangeburg type" please remember that "orangeburg type" does not mean Orangeburg Brand Fibre Conduit. That's the brand and quality made by us alone.

Vital electrical cables deserve the best protection and we have spent nearly 70 years trying to make Orangeburg Brand Fibre Conduit the best that money can buy.

"No substitute is as good as the regular" it tries to replace.

KLEAN-KOTE*

ORANGEBURG®

BRAND

FIBRE CONDUIT

FLINTKOTE®

*KLEAN-KOTE IS A TRADE-MARK, U. S. PATENT APPLIED FOR.

Orangeburg Manufacturing Co., Orangeburg, New York. Division of The Flintkote Company, Manufacturer of America's Broadest Line of Building Products

GraybaR stocks save you

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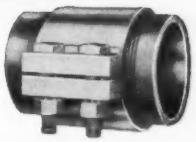
GArfield 1-7846

CABLE SUPPORTS
CONDUIT TYPE

CONDUIT FITTINGS

CABLE SUPPORTS
SPLIT TYPE



SPLIT
COUPLINGS

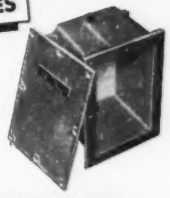
EXPANSION
FITTINGS

INSULATED
BUSHINGS

BAKELITE
BUSHINGS

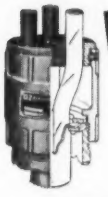
CAST IRON BOXES

EXPLOSION-PROOF
TYPE

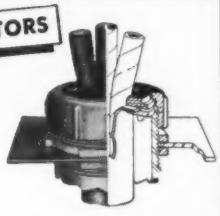


WEATHERTIGHT
SUBMERSIBLE TYPE

CABLE TERMINATORS

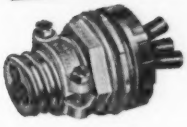


TERMINATING
POTHEADS



SEALING
BUSHINGS

INTERLOCKED ARMOR CABLE FITTINGS



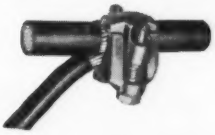
TERMINATORS

SPLICING
FITTINGS

COMBINATION
LUGS

SOLDERLESS CONNECTORS

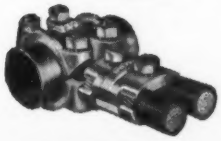
COMBINATION
TWO-WAY
CONNECTORS



SERVICE
TAP

COMBINATION
TEE AND
PARALLEL CONNECTORS

POWER CONNECTORS



T-CONNECTORS, TUBE
TO MULTIPLE CABLE TYPE

BUS BAR
CLAMPS

GROUND CONNECTORS

CABLE TO PIPE OR ROD
90° OR PARALLEL

CABLE TO
FLAT BAR

They're O. K. if They're O. Z.

the cost of possession

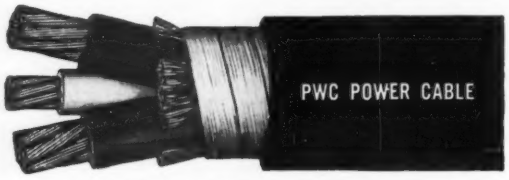
PWC INSULATED WIRES, CABLES AND CORD SETS

BUS DROP CABLE
Flexible and extensible branch circuits for machine shops.

TYPE ST YANKEE SAFETY CORD
UL listed Type ST and SJT in Safety Yellow.

STATION CONTROL CABLE
Conforms to IPCEA Standards, column "B" insulation.

PARALLEL POWER AND MINE CABLE
Listed by U. S. and Penna. Bureau of Mines.



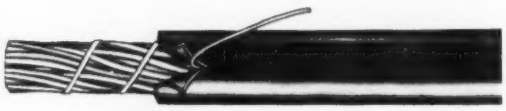
TYPE ST FLEXIBLE POWER CABLE
Conforms to IPCEA and U.L. for 600 volt cables.

APPLIANCE WIRING MATERIAL
90° and 105°C Underwriters' Laboratories listed.

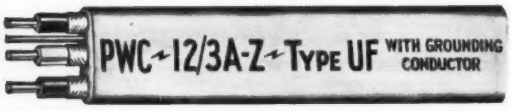
GASOLINE AND OIL RESISTANT WIRE
UL approved—sizes #14 to 500 MCM.

TYPE ST OIL-PROOF
UL listed Oil Proof Type ST and SJT.

IMSA CONTROL CABLE
Conforms to IMSA Specifications 19 and 20—1956.



INSIDE TELEPHONE CABLE
Commercial establishments and special plan wiring systems.



A-Z TYPE UF
Single conductor No. 14 to No. 4/0 Multiple conductor No. 14 to No. 6.

RANGE AND DRYER CORD SET
Underwriters' Laboratories listed.

FLEXIBLE CABLE
Conforms to UL and IPCEA Standard.

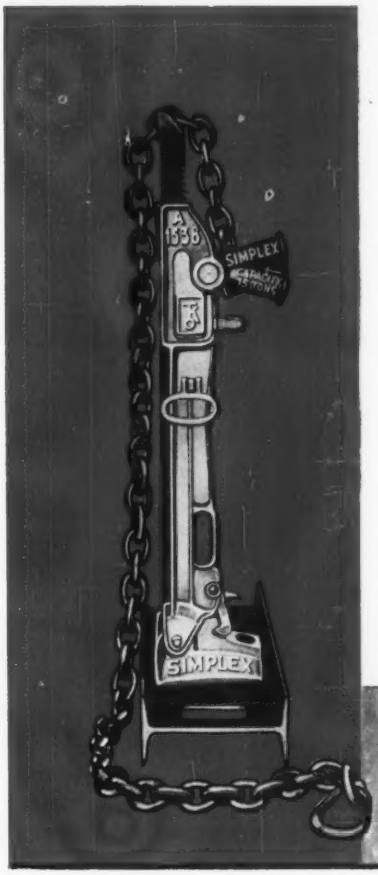
EXTENSION CORD SET
Safety yellow for portable tools, outside lights and power.

For additional information and special construction contact the PWC General Office.

THE PLASTIC WIRE & CABLE CORPORATION

JEWETT CITY, CONNECTICUT

GraybaR stocks save you



Pull Any Size Pole *Easier*

with the ALUMINUM ALLOY SIMPLEX POLE JACK

15 Ton Capacity . . . . Weighs only 60 Pounds

Aluminum housing of the Simplex heavy-duty Pole Jack eliminates 35 pounds of weight, without sacrificing a pound of lifting capacity. You can pull or straighten poles, pull butts or move loaded poles without interruption to service—and without digging. Only 60 pounds in weight, it's easy to move from job to job; saves time and work. The husky "I" beam base gives a firm foundation; jack pivots on the base when pawl is disengaged. The A-1538 has 15-ton capacity and 22-inch lift. Comes completely equipped with new alloy steel chain and lever bar.

AERIAL CABLE AND WIRE TENSIONING JACK

Capacity 2 tons.

MANHOLE SHEAVE

Handles up to 3-inches diameter cable or any size winch line. Light weight aluminum.

JUNIOR POLE JACK No. 325

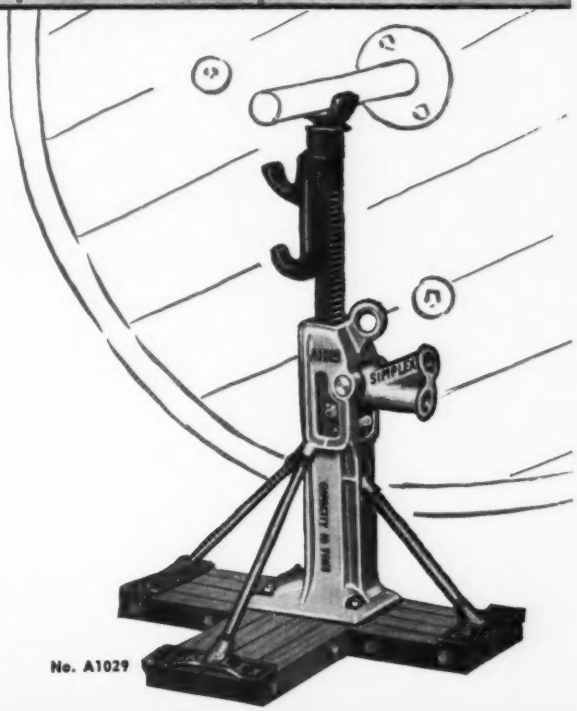
Pulls or straightens poles up to 30 feet high. 5-ton capacity.

Simplex ALUMINUM Reel Jacks

for safe handling of all reel sizes

No. A1029—Single Acting, 10 Ton Capacity. Aluminum alloy housing reduces weight 21 pounds. For outside work where footing may be uneven. T-shaped base has total area of 319 square inches, with three threaded and adjustable steel rods insuring a firm, non-rocking foundation. Furnished with left and right hand bases; Jacks are generally paired to keep operators in sight of each other for even lifting. Handles reels from 36" to 84" in diameter. Equipped with 3 lifting hooks 17", 23" and 29", respectively, from ground level. Top hook for 3" spindles, and the other 2 for 2½" spindles.

Get full information now from your Graybar Branch, or write for Mechanical Catalog



No. A1029

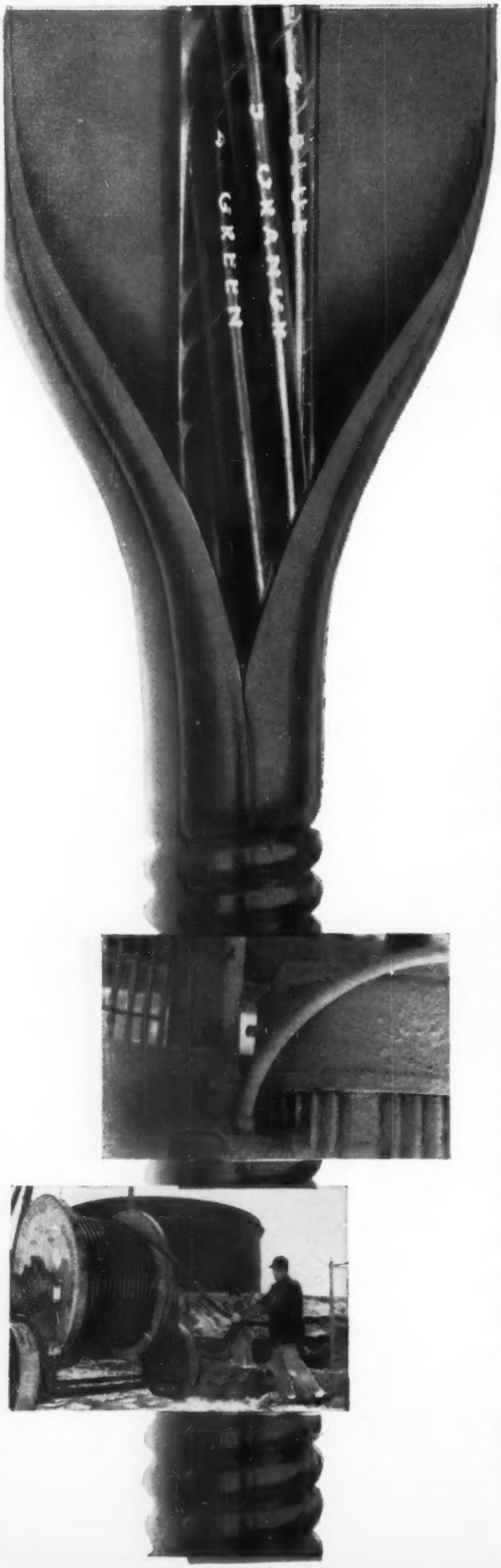
WORLD'S LARGEST MFGRS. OF INDUSTRIAL MECHANICAL AND HYDRAULIC JACKS

SIMPLEX JACKS

TEMPLETON, KENLY & COMPANY

2515 Gardner Road • Broadview, Illinois

the cost of possession



Only C-L-X®
Continuous Lightweight eXterior

Sealed Cable Systems by Simplex Can do so Many Jobs so Well

Simplex C-L-X is a packaged combination of cable and an extremely pliable, corrugated metal sheath. It requires no separate duct or conduit regardless of environment. It is available with steel sheath and plastic jacketing; and with copper or aluminum sheaths, with or without plastic jacketing.

C-L-X Cuts Installation Costs

By using a single length of 3-conductor 15KV C-L-X for both underground and aerial use, a Southeastern utility company saved more than 20,000 dollars from what it would have cost for a complete underground duct system.

Resists Chemical Attack

Conduit life in this company's calcium chloride reclamation building was only 6 to 9 months. The conduit was replaced with a C-L-X cable system which — after two years of operation, shows no signs of deterioration.

Protects Against Liquids and Gases

An East Coast petroleum tank farm used a C-L-X 8-conductor cable protected with PVC for direct burial in ground that was saturated with oil, gas and water. Result: Perfect performance at a sizeable savings over conduit systems.

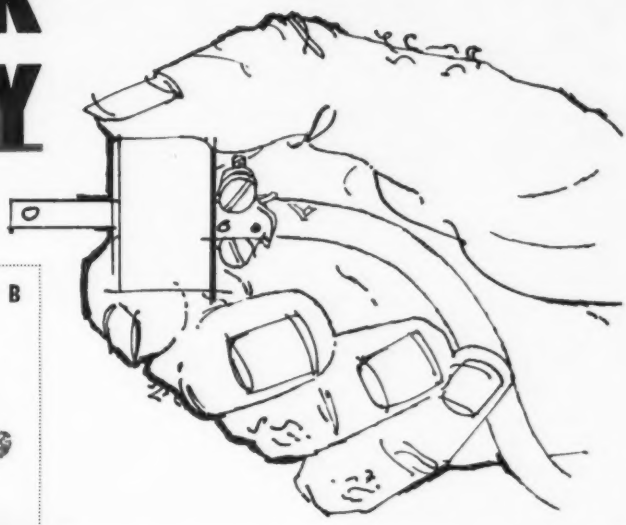
Only Simplex C-L-X offers you: Exceptional Strength . . . Unequalled Pliability . . . Protection from Liquids and Gases . . . Faster Installation and Lower Costs. Send for Illustrated Brochure containing Application and Engineering Data.

SIMPLEX WIRE & CABLE Co.

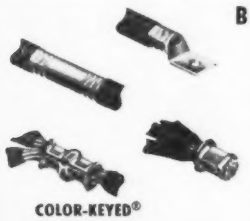
CAMBRIDGE, MASSACHUSETTS

GraybaR stocks save you

WHEREVER ELECTRICITY GOES • • •

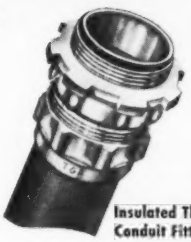


B



COLOR-KEYED® Connectors

C



Insulated Throat Conduit Fittings

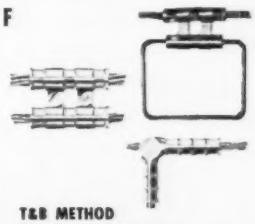
D

Interlocked Armored Cable Fittings

E

REDDY™ Tap
REDDY™ Lug

F

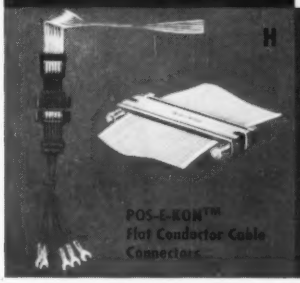


T&B METHOD Distribution Connectors

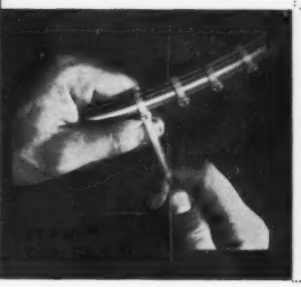
G

Watertight Floor Boxes

H



POS-E-KON™ Flat Conductor Cable Connectors



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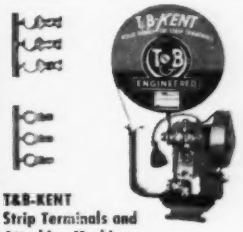

T&B-KENT Strip Terminals and Attaching Machines

For *every* electrical need—The Thomas & Betts Company offers a complete selection of connecting devices, terminals and fittings, designed for top performance at lowest installed cost. Illustrated are just a few of the many T&B-Engineered products that have proven themselves outstanding in the field. Wherever electricity goes . . . whatever the conductor . . . you're certain of complete reliability when you specify—and use—T&B Products. For further information, write to The Thomas & Betts Co., Incorporated, Elizabeth 1, New Jersey. In Canada: Thomas & Betts Ltd., Montreal, Quebec.

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B—BULLETIN CKP1
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D—BULLETIN F5-47
E—BULLETIN #86
F—BULLETIN U1-27
G—BULLETIN #85
H—BULLETIN P3-57
I—BULLETIN TR-3
J—BULLETIN K1-3

T&B ENGINEERED **THOMAS & BETTS**

SOLD COAST TO COAST EXCLUSIVELY BY YOUR T&B DISTRIBUTOR

the cost of possession

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West Reading

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Madison
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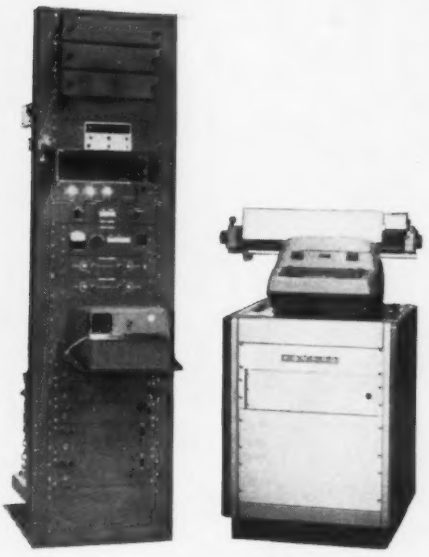
With over 130 Graybar service centers around the country—one is sure to be reasonably close to you. And it either has in stock, or will get quickly, everything you need. ● Even highly special supplies are no problem.

Just let us know what you need—in advance—and we'll keep it in stock for you. ● So don't tie up your capital in inventory. Let Graybar bear the cost of ownership. And when you need supplies, call Graybar—for everything.

GraybaR

New Equipment



Data Alarm System . . .

. . . of modular building-block design, scans, telemeters and records with standard field-proven components. Series 7000 automatically scans and measures voltages, demand, wattage, var and temperature quantities from potential transformers, punch-type demand meters, thermoverters and thermohm units located at remote substations. It converts this data into digital form and telemeters it to a central control station, where it is recorded by electric typewriter on preprinted log sheets. Measurement and transmission of data can also be manual. The system checks itself by means of a standard input signal stable to $\pm 0.05\%$.
Monitor Systems, Inc, Fort Washington, Pa.

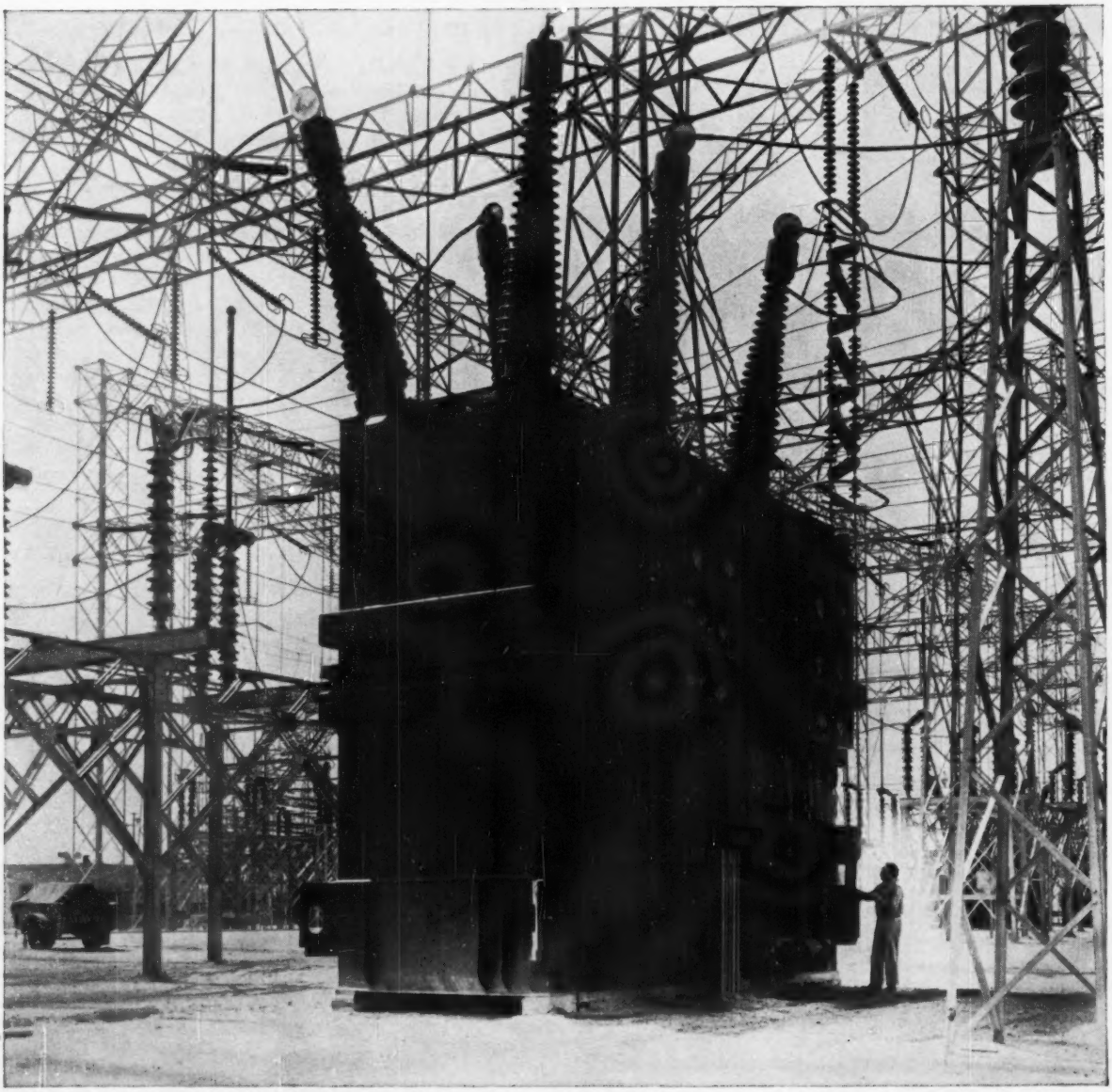
Nuclear Instruments . . .

. . . in the new Logic series (in foreground and center, background) combine with previously developed Standard Series instruments to make up this well equipped lab. Model No. 701 liquid scintillation detector with logic scaler (left in foreground), manually operated, is designed for room-temperature counting of carbon-14, tritium and other soft beta-emitting isotopes. The C120 automatic sample changer (right in foreground), handles and counts as many as 49 gamma-emitting liquid or solid samples. Actigraph II^R system (left in background) is the heart of an automatic system to detect, measure and record position and total activity of separated radioactive components on a strip chromatogram. Model C210 automatic sample changer for large-diameter solid beta samples (center, background) will accept as many as 50 samples, with provision available for 100 and more. Models No. 6000 and 6020 Dynacon electrometers (right, background) compose a dynamic-capacitor electrometer system with ionic-chamber detection, designed primarily for measuring activity of soft beta-emitting isotopes such as carbon-14 and tritium.
Nuclear-Chicago Corp, Des Plaines, Ill.

Surface-Mounted Transformer . . .

. . . is low-profile, single-phase, for residential use. Available in 25-50 kva, 15 and below with 240/120 secondary rating, its high-voltage interrupter switch is capable of interrupting full load current. The 50-kva unit is ⅓ smaller and 750 lb lighter than existing units. A grounded steel barrier completely separates the high and low-voltage side of the cable compartment. Overlapped high and low-voltage compartment doors are an added safety feature, and four steps must be taken to gain entrance to high-voltage live parts.
Allis-Chalmers Manufacturing Co, Milwaukee 1, Wis.

(*More New Equipment on page* 119)



UNIVOLT® 35 TRANSFORMER OIL STARTS DRY AND STAYS DRY!

Small traces of moisture — as little as 0.03 to 0.05% — can seriously impair the dielectric strength of an insulating medium. That's why Univolt 35 transformer oil is passed through blotter presses to assure complete dryness before shipping... packaged in sealed containers to prevent the entrance of moisture... loaded *indoors* in specially prepared tank cars never used for any other purpose. In service, Univolt 35 resists emulsification from any moisture which may enter the transformer.

Univolt 35 offers excellent dielectric strength and low power factor. Free from acids, alkali and corrosive sulfur, it resists oxidation and will not attack the varnish finish on coils. Its high-temperature stability makes it particularly valuable during peak summer loads. Univolt N-36 has the same characteristics, plus an effective oxidation inhibitor.

TERESSO® premium-quality turbine oils are triple inhibited for protection against rust, foaming and oil breakdown. Your Esso Representative, backed by a system of Sales Service Laboratories, can help you pick the right product for every purpose. Give him a call, or write to us at: 15 West 51st Street, New York 19, N. Y.

ESSO STANDARD, DIVISION OF
HUMBLE OIL & REFINING COMPANY

Meter Enclosure . . .

. . . **is weatherproof** and accommodates "A" base meters, with use of adapter kits. It also permits conversion to "S"-type meters. Convert-A-Socket adapter kits allow units to be changed over to any style of socket-type metering. Each kit contains socket blocks, gasket support, surge bracket, mounting plate assembly, and all necessary mounting hardware. Enclosures are galvanealed steel or aluminum, in either 11x 22x3¾ in. or 7$\frac{7}{16}$x14x3¾ in. sizes.

Superior Switchboard & Devices Co, 410 Schroyer Ave, SW Canton 1, Ohio

Surface Protective . . .

. . . **serves as anti-moisture** and anti-corrosion treatment for surfaces of electrical equipment. CRC 2-26 is a stable, inert compound which displaces water in the form of moisture and condensation in electrical equipment, covering all surfaces with thin, molecular film. This film is said to prevent effectively re-entry of moisture, simultaneously protecting metal surfaces against corrosion. It does not affect electrical characteristics of the component or system and is said to reduce down time.

Corrosion Reaction Consultants, Inc, 116 Chestnut St, Philadelphia 6, Pa.

(*More New Equipment, p* 120)

First in Performance Values

SLOW DISK SPEED (10 rpm at rated load) minimizes the effect of current damping on high loads and inherently requires less compensation to produce a more uniform registration curve.

HIGHEST TORQUE (from 10 to 100% above other meters) produces better stability . . . more uniform registration . . . more accurate light load performance. Especially helpful when demand registers, cyclometer registers or contacts are used.

LOWEST LOSSES (up to 10% less than other meters). While this loss is only 10 kwhr per year on a single meter . . . multiply by the total number of meters in service. The answer will surprise you!

REFINED TEMPERATURE COMPENSATION is an important element in meter performance. From —30°F. to +150°F., superior J3 temperature compensation gives almost perfect straight line accuracy.

COMPARE disk speed, torque, watts loss, temperature compensation. To these features, add the superior magnetic moving system. That's the J3, first in performance values.

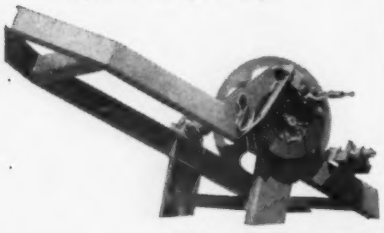
SANGAMO ELECTRIC COMPANY SPRINGFIELD ILLINOIS

Now—Convert your own Reel Dolly to a Bullwheel Tensioner WITH A

PENGO 5000-U Assembly

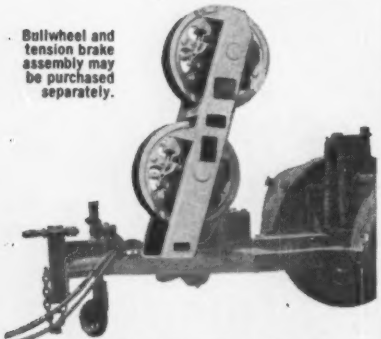
5000-U assembly installed by City of Medicine Hat, Alberta, Canada

Here's an easy way to build up a modern bullwheel tensioner at low cost—simply install a PENGO 5000-U Bullwheel Assembly to your old trailer or reel dolly. You'll have a tensioner with Neoprene-lined 26" bullwheels, capable of handling practically any distribution line stringing job at tensions to 2,000 lbs. at up to 4 mph.



Support arms, reel spindle with reel brake, and hand rewind assembly. 2¾" spindle will handle reels to 75" diameter, 44" width unless reduced to fit your trailer.

Bullwheel and tension brake assembly may be purchased separately.

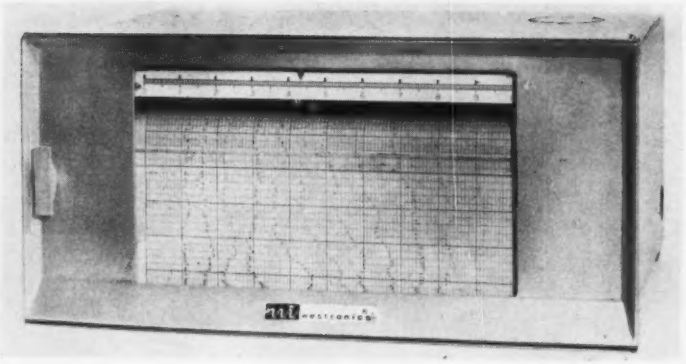


We invite you to write or wire for literature, prices—please address Dept. 124.

PETERSEN ENGINEERING COMPANY, INC.

Santa Clara, California

Phone: AXminster 6-7712

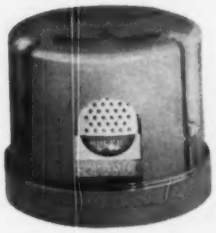


Multipoint Recorder . . .

. . . scans and measures 2 to 12 input sources at 5 sec per point. (Faster or slower print rates are available.) Model M11A compact, strip-chart recorder is 8½ in. high, with calibrated chart width of 11 in., mounted on 19-in.-wide relay rack panel. Almost instantaneous range changes from one temperature span to another or from temperature to millivolt spans and vice-versa are provided by plug-in modules. Recorder can be changed at will from basic 12-point unit to 6, 4, 3 or 2-point unit by changing printhead and programmer-input jumper plug on rear of unit.

Westronics, Inc, 3605 McCart St, Fort Worth 10, Tex.

Photoelectric Control . . .



. . . has a simplified circuit for street lighting control. Model 6620 is a refinement of F-P tubeless Model 6600A. It uses the same hermetically sealed cadmium-sulfide photocell and the same lightning protection, but initiates a fully tested Sigma-true ac relay which permits elimination of rectifier and capacitors. Control conforms to EEI-NEMA specifications and may be used with numerous popular luminaires. It may be mounted on bases up to 3¾-in. dia. Adapters are available for crossarm, pole-top, or bracket mounting.

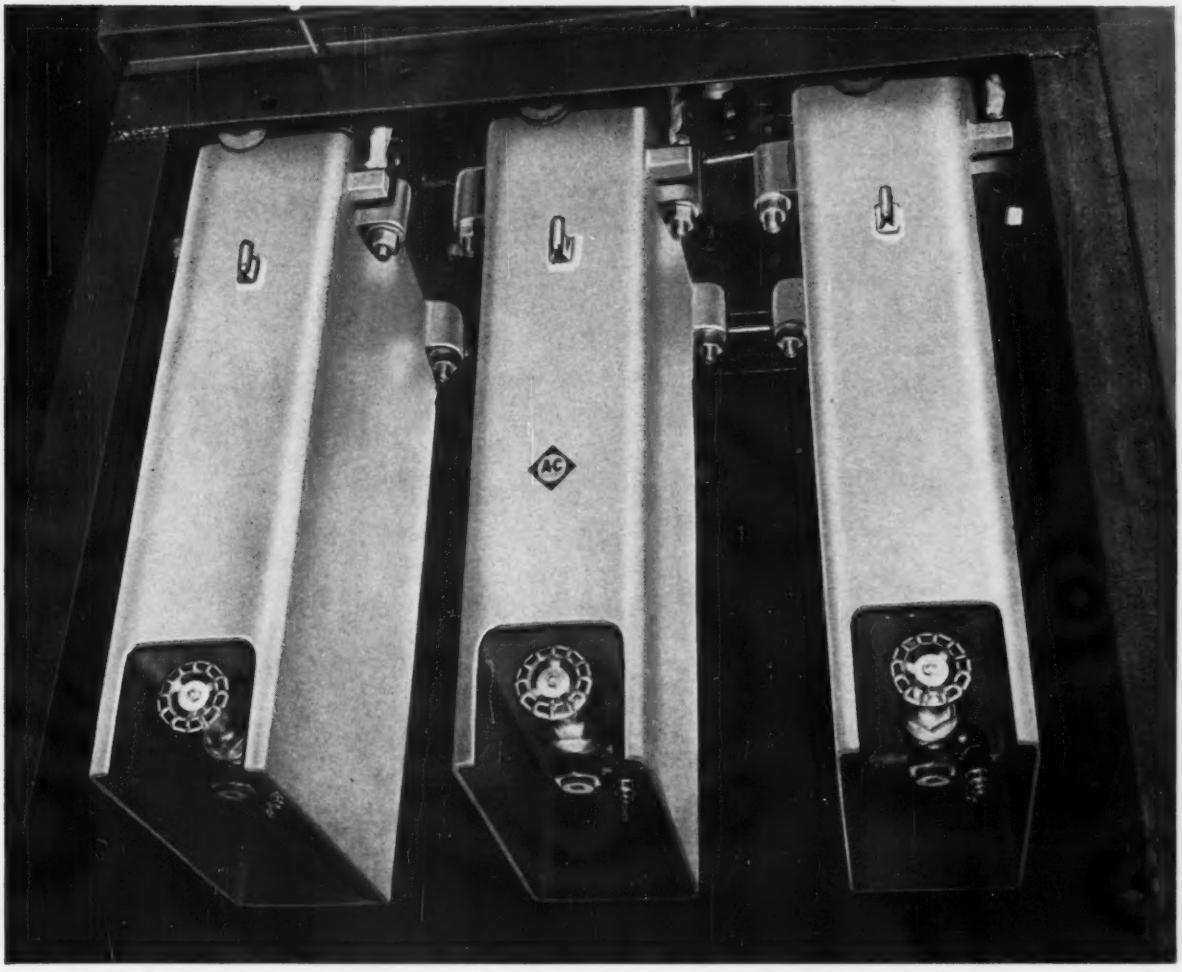
Fisher-Pierce Div, Sigma Instruments, Inc, 170 Pearl St, S Braintree 85, Mass.

Two-Way Vehicular Radio . . .

. . . incorporates 30-w power output to give greater range, also eliminates vibrators through use of transistorized power supply. The VHF FM mobile system is available in MJ-52 for low-band operation in 32 to 55-Mc range and Model SL150 for high-band operation in 150 to 175-Mc range. Both models have modulation acceptance of 6 kc deviation.

Checker Electronics Corp, Box 251, Grayslake, Ill.

ALLIS-CHALMERS



Absolute phase isolation

...available on 14.4 and 23-kv outdoor distribution breakers!

Three-tank construction is a must for transmission circuit breakers to prevent phase-to-phase flashover. A-C gives you this same positive-protection, three-tank construction in 14.4 and 23-kv breakers.

Allis-Chalmers breaker protection extends even further! Each tank is lined with high dielectric insulation. Liners are nonbuckling, nonwarping.

Three-tank design cuts oil contamination and maintenance, since only the faulted phase is affected. And new Type LO cross-blast interrupters (250 and 500 mva) minimize oil contamination even further by reducing interrupting time to *5 cycles* over the *entire* range of interrupting currents (up to 25,000 amps).

Type OZ breakers are available in 600 and 1200-ampere continuous-current ratings. Your nearby A-C office can give you full details, or request Bulletin 71B9705 from **Allis-Chalmers,** *Power Equipment Division, Milwaukee 1, Wisconsin.* A-1425

Two rugged, cross-blast interrupters per phase reduce arcing time to less than 5 cycles — sharply cut oil contamination.

SAVE $414 per truck IN THE FIRST YEAR!

NEW FORD ECONOLINE VANS

Now, *you can save $312 to $433 in price* alone* on a Ford Econoline Van compared to old-style half-ton panels. In addition, you can save over $100 every 16,000 miles you drive!

These savings come with a man-size truck. The Econoline's cab-forward design with welded "body-frame" gives bridge-like strength and reduces dead weight to haul a full ¾-ton. Only 14 feet overall, Ford Econolines are nimble in traffic, easy to park, need less garage space. Big 4-ft. door opening (both curbside and rear) and level cargo floor provide new loading ease . . . new load workability.

Special Note To Pickup Owners: Now, you can protect your loads from weather and theft with an Econoline Van . . . yet, pay less* than for most conventional ½-ton pickups. And you can get the same $102 savings on operating expenses as shown at the right.

**Based on a comparison of latest available manufacturers' suggested retail prices*

HERE'S HOW YOU SAVE

SAVINGS ON OPERATING EXPENSES EVERY YEAR!

GAS Econoline trucks can give 30% better gas mileage than conventional ½-tonners. Figuring 16,000 miles per year at prevailing gas prices, you save..... **$70**

OIL—Crankcase capacity is only 3½ quarts instead of 5 quarts, and the recommended oil change interval is 4,000 miles versus 2,000 miles. In 16,000 miles you save..... **$13**

TIRES—Econoline tires last longer, cost less to replace. Prorated saving for 16,000 miles as high as $53. Typical saving..... **$16**

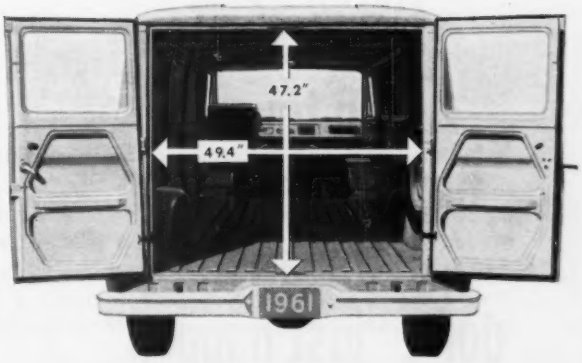
LICENSE—In many states (not all) the license for an Econoline costs appreciably less—up to $30.40 per year. Average for all states is..... **$3**

$102

SAVING ON PRICE—You can save $312 compared to even the lowest-priced conventional ½-ton panel—and up to $433 against others! Saving at least..... **$312**

TOTAL FIRST YEAR SAVINGS... $414

and you keep saving $102 EVERY YEAR!



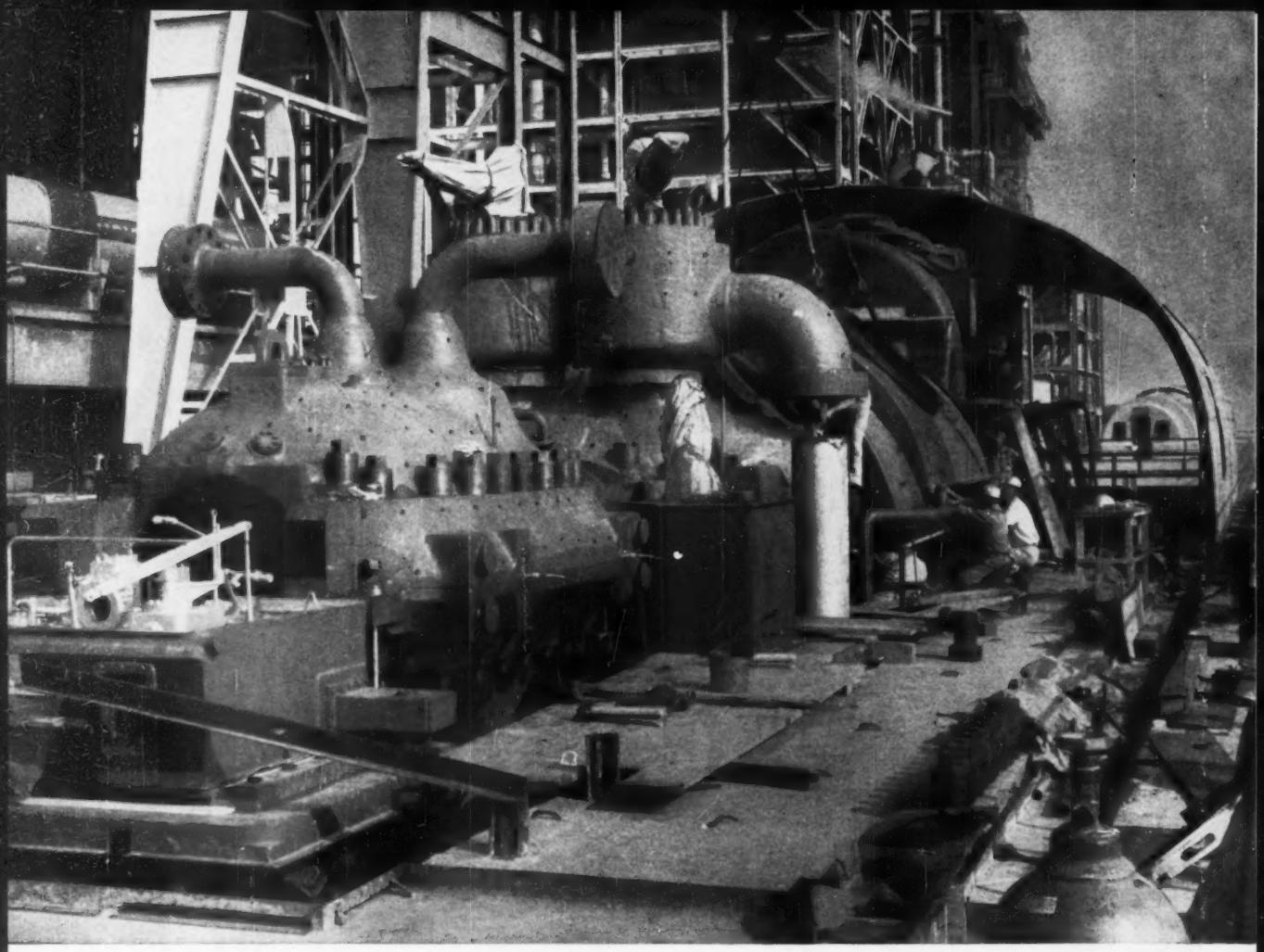
NO REAR ENGINE HUMP!

The Econoline's "up front" engine leaves a level, knee-high floor almost 9 ft. long. There's no awkward rear-engine-housing hump to shrink the back entrance or hinder loading. And the Econoline Van provides over 204 cu. ft. of loadspace . . . up to 57 cu. ft. more than conventional ½-ton panels.

FORD TRUCKS COST LESS

SEE YOUR FORD DEALER'S "CERTIFIED ECONOMY BOOK" FOR PROOF!

FORD DIVISION, Ford Motor Company



General Electric's experienced turbine-generator service teams have built an unsurpassed record on economical, on-time installations.

Economical, on-time turbine-generator installations don't "just happen"

Thorough planning plus know-how contribute to economical, on-time turbine-generator installations. General Electric's unparalleled record in this area is built on:

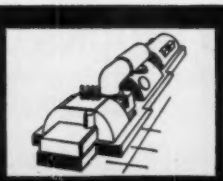
- pre-installation planning with purchasers to program the installation in terms of time, manpower, and scheduling requirements,
- know-how of G.E.'s turbine-generator service teams which provides on-the-job savings and helps keep the installation on schedule, and
- progress appraisals to purchasers which aid in keeping the over-all installation moving smoothly.

When you specify a General Electric turbine-generator you get a unit pre-engineered for economical, on-time installation—and you get personalized service for as long as that unit is on-the-line. 244-08

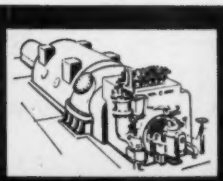
Progress Is Our Most Important Product

GENERAL ELECTRIC

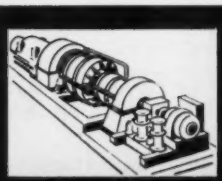
General Electric Turbine-Generators Help Keep Power Costs Low



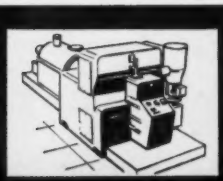
Steam turbine-generators for large blocks of power



Steam turbine-generators 100,000 kw and lower



Gas turbines for peaking, base load, combined cycles



Mechanical drive steam turbines for auxiliaries

Electrical World

JUNE 19, 1961

Management Newsletter

Measuring Your Public Relations

Most utilities agree today that an effective public relations program is an important part of the business. But how do you know when your public relations is effective? In most activities of the modern corporation some sort of measurement is usually possible. Through modern cost accounting methods, for instance, utilities can get a pretty fair approximation of the total cost of servicing a customer. And the watthour meter tells them what kind of return they're getting on this investment. Cost accounting can also tell a company what its public relations effort costs. But no meter has yet been designed to tell the company what it's getting back for its PR dollar.

This doesn't mean that a utility has to remain completely in the dark. Public relations men have developed several techniques for reading the reception that their work receives. John T. Cunningham, public relations consultant at Commonwealth Services, specializes in this area. He has developed a method for measuring the effectiveness of a PR program that might be helpful to many utilities.

Measuring public relations, says Cunningham, is like measuring anything else. Two things are needed. First, you need some sort of scale or standard. Secondly, you need a series of tools to tell you how far along the scale you've advanced.

The scale is simply the objectives of the program. What is the company trying to accomplish? What does it want to get across to its customers, to its stockholders, to civic and government groups, to the financial community? Only when a company has clearly established what it wants from its program will it be able to judge whether or not the program is a success.

A set of tools to measure progress are the various methods of sampling public opinion. This tells you how the public feels about the company's policies and actions. By placing the results of the sampling along side the program's objectives, a utility can get a pretty fair idea of what kind of return it's getting on its PR investment.

Let's start with the first step. How should a utility go about fixing the objectives of its program? No two utilities face the same audience, and no one can give an overall statement of what a company's goals should be without specific information on the local picture. But Cunningham feels that two points are extremely important in fixing objectives regardless of the individual situation.

In the first place, fixing public relations objectives is top management's responsibility. Because the chief executive is the company's foremost public relations representative, maximum effectiveness in any public relations program is gained by organizing public relations as a staff function under his direction.

Secondly, the PR department should have clearly stated goals, defined not only in a general way, but also in a specific way. For example, the specific goals of a stockholder relations program might be:

- To inform all stockholders regularly about company activities on topics of general interest to them, within the realm of practicality. The number of stockholders necessitates that most of these communications be in written form.
- To encourage shareholders to communicate with management, and management to give courteous attention to such communications.
- To see that qualified investment representatives from the financial community receive special opportunities to communicate with management.

Once a company has detailed objectives, it has a meter scale against which to measure its public relations program. This program is nothing more than a detailed set of policies and procedures designed to accomplish these objectives. Management is usually well aware of its objectives, but it sometimes fails to recognize that subordinates may have a different interpretation of the job to be done. Formalized objectives offer a road map to help see that management's goals are understood and followed.

But before this scale can be used in measuring the public's reaction to your overall program, you should first check to see whether individual projects are adequate to meet the objectives.

Here are questions to keep in mind as you audit each of the individual segments of the public relations program. How was it planned? Was sufficient time given to advance planning? Did everyone concerned understand the project's goal? Was necessary cooperation secured from all affected departments? How complete was the program? Were efforts balanced among all pertinent segments of the public? How were publicity and other communications activities handled? Could additional publicity have been secured from other media? Was adequate attention given to advance and follow-up publicity? Did the project show an imaginative approach to problems? Were adequate provisions made for unforeseen circumstances? Did the program stay within its budget? If not, why? Shortcomings here must be corrected immediately. They indicate that your program isn't putting out all that it could.

Now you are ready to meter the various publics' reactions to the program and thus try to answer the question: Are you achieving your objectives? This actual metering can be accomplished in two ways: 1) By depth interviews with small but select publics such as employees, editors, the public utility commission, and civic leaders; 2) By more formal polling methods to reach the larger numbers of customers and stockholders.

Employees are the first important public to be checked. Your audit should include personal interviews with executives and representative employees from all departments, with special attention to those who contact the public. These depth interviews will help highlight areas where additional customer relations training seems needed. You will learn employees' impressions of various programs and company policies dealing with public relations.

What questions should be asked employees? Each company will approach these talks within the framework of local conditions. Here are some of the questions you may want to consider. What is your impression of the way we handle relations with our customers? Do you know any specific situations where an outstanding job has been done in handling customer relations? Have you had any personal experiences that would indicate that the company could improve its customer relations? In what ways have you been disappointed by other people in the company who deal with customers? Do you see company advertising? Where? What do you think of it? What do you think customers think of it? How could the company magazine be improved? What do you particularly like about it? Do you always have enough information to answer customers' quessions? Do you have any ideas for improving the way we work with customers?

Personal interviews with the public utilities commission, editors, and other community leaders have a double-barrelled PR significance. The number to be seen is relatively small, but each individual exerts a stronger than average influence on company activities. Serious talks with them will usually develop suggestions for improvement, and in themselves, the talks are excellent public relations. Each man interviewed gains a new feeling of closeness to the company. These interviews can be conducted by the public relations director, though there is much to be said for using outside specialists because they are not known personally and can view things in a more objective light. The line of questioning will be dictated by local conditions, and the interviewer's sense of propriety. In most cases the interviewed person's contacts with the company should be emphasized, but opinions should also be sought on other pertinent matters affecting PR.

Three basic tools for more formal polling or surveying of opinion include personal interviews, mail questionnaires, and telephone interviews. An effective public relations department will often use all three tools in combination, depending upon the depth of information desired and available funds. Cunningham points out that personal interviews offer maximum data with a minimum of error. The interviewer can tailor his approach to each individual, and sometimes the things that are not said are as important as the answers given, if properly noted. This is the only way to make sure that your replies are completely representative, since some groups in each community have no telephones and are prone to ignore written questionnaires. The disadvantages of personal interviews include the expense and time they take, the need for interviewer training, and the possibility that the interviewer will create some bias in the minds of those contacted.

Mail surveys offer a number of advantages when polling public utility customers and stockholders. Properly worded and executed such surveys are relatively inexpensive. Mailing lists can be taken from company records, and mailings can be repeated regularly with minimum effort. A brief mail questionnaire, which can be on post cards, will often develop from 40 to 50% replies without follow-up. How-

ever there are limitations. Most people find it hard to express themselves in writing. Only a limited number of topics can be covered, and replies are likely to be less reliable than those secured by voice contact. The third method, telephone interviews, has one big advantage—speed.

But here is one way to survey customer opinions regularly by combining all three types of interviews. Plan a regular monthly mail questionaire to a representative sample of from 400 to 1,000 customers, depending on company size. If available, help can be secured from market research or auditing personnel, working with the public relations director. If additional help is needed, the advice of outside specialists can be called on.

The economy and ease of handling return post card questionnaires makes them preferred by many companies. Considerable care should go into the wording of individual questions. The presentation of your findings should be considered, to allow effective use of replies in compiling charts and tables. The post cards can be designed for tabulating on punch card machines. The form should look easy to fill out, and as much space as possible should be given for comments and suggestions. In compiling this form, you should try to cover broad trends in areas such as employee courtesy, company service, rates, public ideas about company management, and other company actions. Publicity and advertising can be very helpful in securing customer cooperation, while impressing them with the company's desire to serve their best interests.

Mail questionnaires that aren't answered should be followed-up with telephone interviews. After a period of perhaps two weeks, such calls can bring in replies from another 10 to 20% of your sample. As a last resort, personal calls can be made on those who have not replied by mail or telephone.

Any survey program should be thoroughly tested before it is used. Oversimplification is a major problem with opinion surveys. It is easy to relax important standards and thereby damage your whole effort. All questions and procedures should be field-tested thoroughly to make sure that questionaires are effective and best results are gained.

The final presentation of your findings should be considered with care. Reports should be short and as simple as possible, to present the conclusions reached and the reasons for them. Needless to say the survey program will be subject to improvements and revisions with local experience; however, this approach offers an excellent starting point.

Mail surveys can also tell how you stand with stockholders. Large institutional investors and security analysts are usually kept posted on company affairs. It is the smaller stockholders, many of whom are company customers, who sometimes get too little public relations attention. They should be asked for suggestions on how the company can serve them better. They, too, will appreciate this attention and will be helpful in appraising your present activities. Cunningham stresses that many of these stockholders are not only customers but are influential citizens who affect opinion beyond their immediate families.

Your audit findings should contain a brief summary to highlight good work and needed improvements. Some changes will have been made during your study. Some may seem needed but will be out of the question due to special considerations within your company. Others will require management study and deliberation. Don't bury important considerations in a maze of detail. Where feasible, your audit summary should highlight all findings as a basis for top management to plan future public relations approaches.

CHAFING DAMAGE?

Fig. 1.
This badly abraded tie wire was removed and photographed during an inspection of the tie points on an undamped distribution line in a northwestern state. The line (1/0 ACSR - 6/1) was constructed in the Spring of 1959 and the utility made an inspection 17 months later. The damage was attributed entirely to Aeolian vibration.

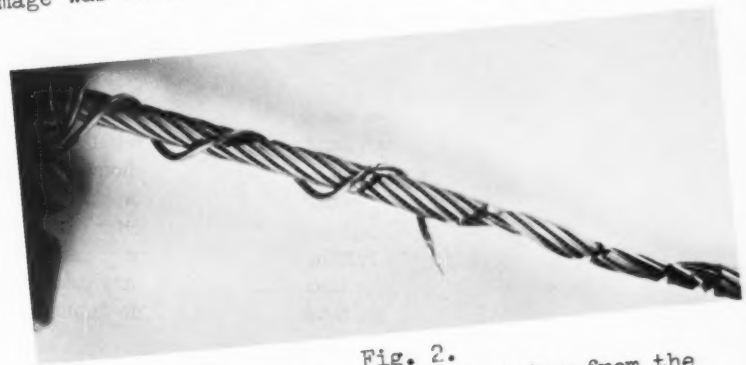
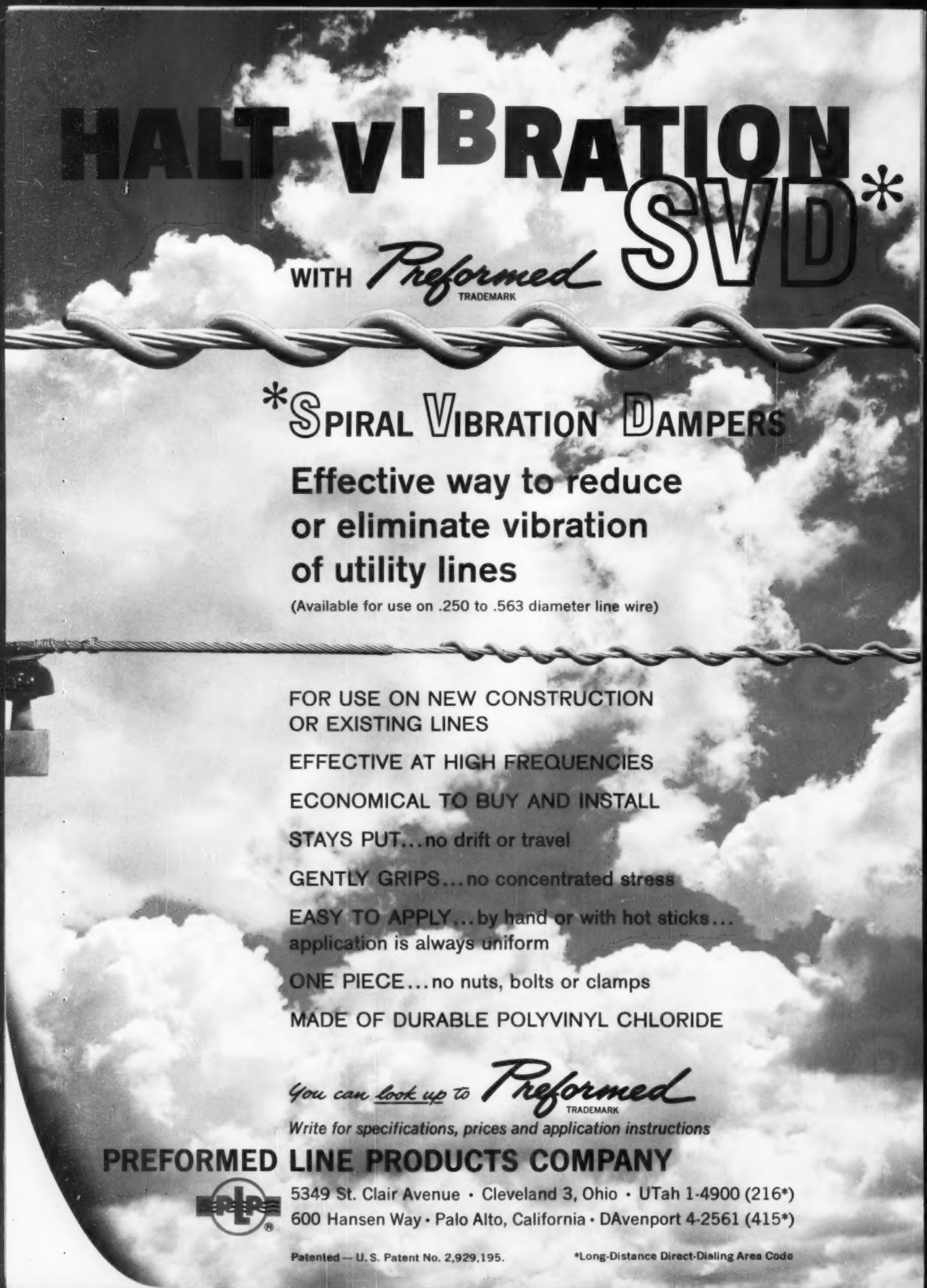


Fig. 2.
Deep gashes in the armor rod, taken from the same line, illustrates the excessive chafing damage resulting from Aeolian vibration on undamped lines in locations where wind, temperature, and terrain are conducive to sustained vibration. Without protective armor rods at the tie points, this damage would have occurred to the conductor.

See other side


HALT VIBRATION
WITH Preformed TRADEMARK
SVD*
*SPIRAL VIBRATION DAMPERS
Effective way to reduce or eliminate vibration of utility lines
(Available for use on .250 to .563 diameter line wire)
FOR USE ON NEW CONSTRUCTION OR EXISTING LINES
EFFECTIVE AT HIGH FREQUENCIES
ECONOMICAL TO BUY AND INSTALL
STAYS PUT... no drift or travel
GENTLY GRIPS... no concentrated stress
EASY TO APPLY... by hand or with hot sticks... application is always uniform
ONE PIECE... no nuts, bolts or clamps
MADE OF DURABLE POLYVINYL CHLORIDE
You can look up to Preformed TRADEMARK
Write for specifications, prices and application instructions
PREFORMED LINE PRODUCTS COMPANY
5349 St. Clair Avenue • Cleveland 3, Ohio • UTah 1-4900 (216*)
600 Hansen Way • Palo Alto, California • DAvenport 4-2561 (415*)
Patented — U. S. Patent No. 2,929,195.
*Long-Distance Direct-Dialing Area Code

Four-Company Power Pool Created

EEI group hears details of 7,000-Mw pool serving greater New York; Con Edison describes centralized data logging

A new four-company power pool, known as the South-east New York Interconnection, that embraces utility systems which supply New York City and adjacent counties has been established and operating since January 1, 1961. The pool was created under terms of a contract among Central Hudson Gas & Electric Co, Orange & Rockland Utilities Inc, Consolidated Edison Co of N.Y. Inc, and Long Island Lighting Co. It has an estimated 1961 summer capability of 7,000,000 kw and serves some 3,500,000 customers representing a load of 6,000,000 kw.

Existence of the new pool was revealed in New York last month before the EEI Electrical Systems and Equipment Committee by H. C. Otten of Con Edison. The new 7,000-Mw pool operates in parallel with and is part of the 36,000-Mw Canadian-US Eastern Interconnection comprising systems in New York, New England, Ontario and southern Michigan.

Four objectives underly the agreement of the pool:

1. Coordinate development and operation of production and transmission systems to effect savings through joint use

2. Allocate savings among member companies

3. Provide economic interchange of power and mutual assistance in emergencies

4. Provide for purchase and sale of energy.

Otten pointed out, however, that the agreement doesn't provide for purchase or sale of energy or generating capability from or to utilities outside the pool area. However, negotiations are in progress on an agreement between each of the four companies and the Niagara Mohawk Power Corp for purchase of economy or emergency energy.

The pool agreement is administered by a four-man "contract committee" made up of a representative from each member company. Scheduling of interchange of economy energy is delegated to the system operator of the Con Edison.

At the same meeting Con Edison disclosed that it has incorporated automatic data logging equipment with supervisory control in converting 12 of its Westchester County substations to unattended operation. The additional cost of the data logging equipment represented only 21% of the total supervisory equipment cost.

In operation, the remote data logging or telemetering part of the system receives dc voltages which are proportional to measured volts, amperes, megawatts, and megavars, from the primary transducers.

12 Subs Get Data Logging

Essentially the data logging equipment automatically takes readings in each remote station and transmits them to a control center, where the data is recorded on punched tape or on log sheets, said A. A. Milusich and L. E. Monacci. Computer programs are being developed to use this data for system planning, and future bulk power substations and high voltage switching stations all will be equipped with supervisory control equipment complete with automatic data logging.

In addition to the 12 substation data-logging installations, three 138-kv switching stations are being equipped with supervisory control systems having analog telemetering equipment and "April" automatic data-logging equipment. Three unattended 4-kv distribution substations are also being equipped with an inexpensive form of automatic logging equipment. Here 4-kv bank and feeder amperes and bus voltages are logged on punched tape collected weekly. This equipment was installed in preference to bank graphic ampere demand meters and feeder indicating demand ammeters.

The Con Edison authors said that automatic data logging equipment was justified for new substations only. They estimated data logging for each substation was $10,000 over supervisory control cost.

A. T. Fugill said Detroit Edison Co has been investigating data logging systems for substations for several years, but has been unable to justify its use economically. He pointed out that flicker information presently on circular charts would be lost by data logging systems.

Other company representatives also indicated that they were investigating substation data logging systems. J. N. Green said that Metropolitan Edison Co had just entered the field but is using it only for immediate operating purposes. Records for long range use are kept in the substation. E. L. Michelson said that Commonwealth Edison Co has been using special recording equipment since 1936. Printometers are used for current readings in transmission and distribution substations. Use of tape records for computer application is under study. A. W. Donovan said that Boston Edison Co has recently installed automatic data logging for substations. A complete record of 49 quantities is printed at a remote point in nine min, using three separate tyyewriters.

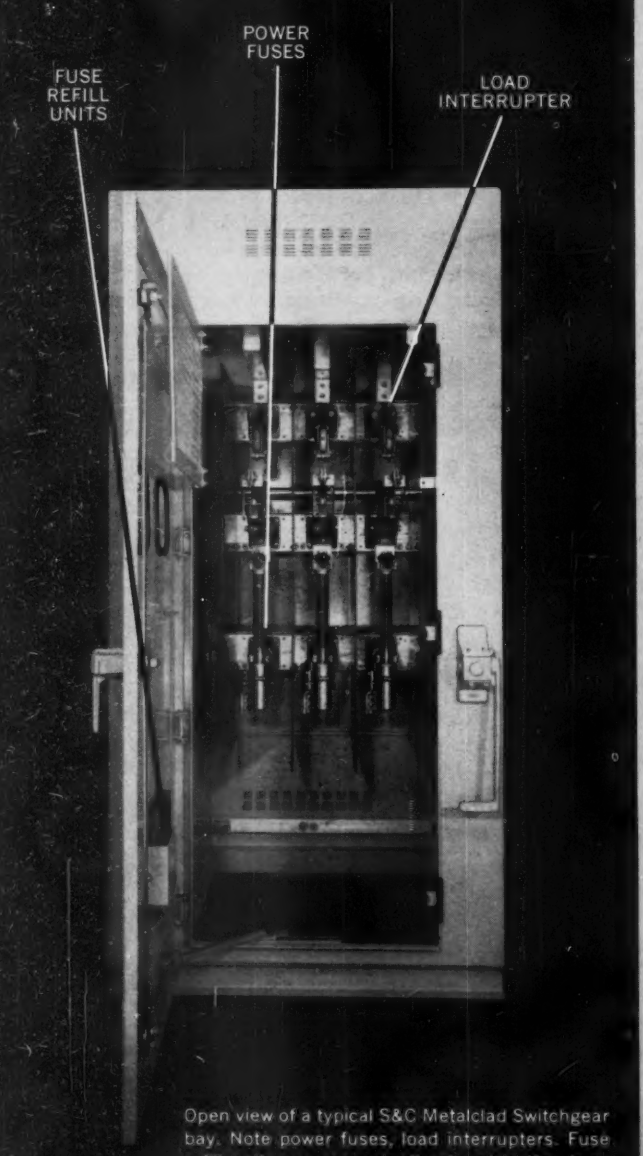
The impact of today's trend in engineering education will have a big influence on the future of the power industry, K. L. Wheeler of Cleveland Electric Illuminating Co said. He cited expansion of teaching in humanities and basic sciences rather than technology.

"If the power industry is to remain a vital force in the American economy," Wheeler pointed out, "it must get its fair share of the top engineering graduates of engineering schools which have turned to the 'new look' in their curricula and those that have not."

The new crop of engineering graduates, he said, will be able to present their ideas better orally and in reports. We, as a result, are going to get better staff work from these men than we do from many of the graduates we have at present.

Featured on the open-session program of the committee was a detailed discussion of the nuclear and electrical design features of Con Edison's Indian Point Station on the Hudson River south of Peekskill. The paper was presented by Richard H. Freyberg and Thomas Griffin.

Leave it to the girls



Open view of a typical S&C Metalclad Switchgear bay. Note power fuses, load interrupters. Fuse refill units are conveniently stored in the door.

They can handle all the maintenance your 2.4 thru 14.4-kv switchgear ever needs...

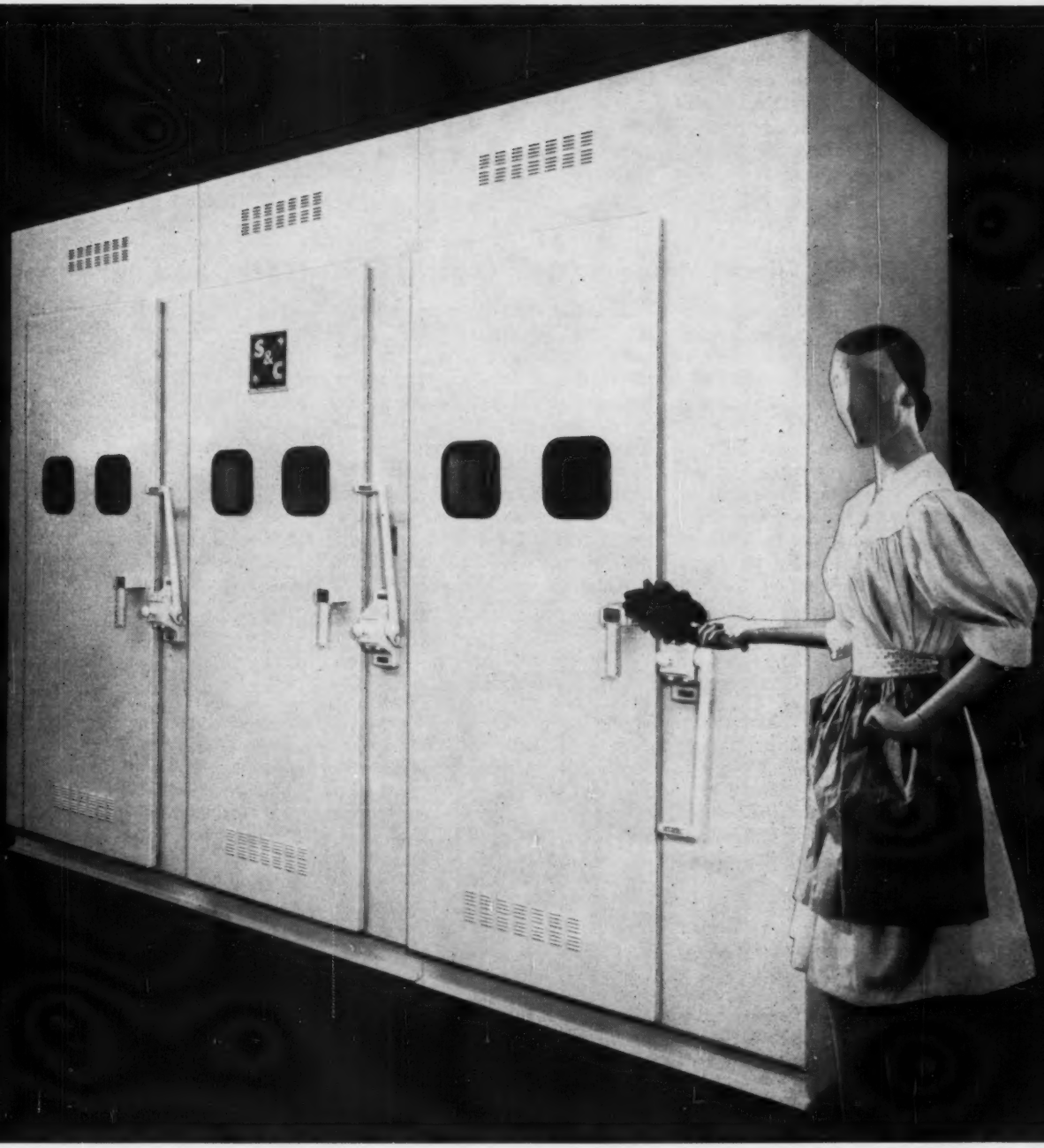
. . . if it's S&C Metalclad Switchgear, that is. For S&C Metalclad Switchgear contains maintenance-free fused load interrupters. (Load interrupters handle all load switching; power fuses handle fault protection.) Fused load interrupters will always work—never need adjusting, setting, inspection, dielectric testing, or periodic exercising and lubrication. Compared to the suggested maintenance schedules for circuit breaker type switchgear, there's virtually no maintenance required.

Equally important, unqualified maintenance personnel can't tamper with planned fault protection—since power fuses employ no relays. What's more, the operating characteristics of S&C power fuses do not change with age or current surges. Current-carrying ability and time-current characteristics of these fuses are permanent.

Remember, too, that this switchgear will cost about half as much as the circuit breakers you might be used to. And it offers full-load switching up to 1200 amperes plus fault interrupting up to 500,000 kva in voltages from 2.4 thru 14.4 kv. It meets all NEC requirements for fault-closing and short-circuit interruption . . . and its performance is proved by high-power tests at KEMA laboratories.

Next time you are thinking about high-voltage switchgear for service entrances, switching centers, substation primaries or substation secondaries . . . leave it to the girls as far as maintenance is concerned. As far as application help is concerned, leave it to your S&C sales engineer. Look for him in the Yellow Pages (Electrical Equipment) in all principal cities. Or write to:

S&C ELECTRIC COMPANY
4421 Ravenswood Avenue • Chicago 40, Illinois
Specialists in High Voltage Circuit Interruption since 1911



Equipment shown is an S&C Metalclad Switchgear Assembly (13.8 kv) used as a switching center. (Dusting is optional!)

Aluminum-Sheath Aerial Cable Is Pioneered on 69-Kv Line (*Continued from page* 61)

pulling, to be both impractical and hazardous. As the cable's weight was not equally distributed, failure of one block could set up a disastrous chain reaction.

Heavy-duty blocks capable of supporting the weight were not available in quantity. But this problem was licked by an inexpensive expedient. Using available materials, LILCO's construction department designed and fabricated steel blocks which, when interspersed with the aluminum ones, gave the needed margin of safety.

Potheads are rated 69 kv and are gas filled at 200 lb pressure integrally with the cable gas system. Spreaders, connecting tubing, and associated parts at the terminals are aluminum with the same mechanical features as the cable joints. Risers in the transition from aerial to underground construction are covered for mechanical protection with a newly devised ventilated riser guard. This guard helps achieve for the riser portion the same thermal rating as that of the rest of the system.

Engineering and planning began in 1959. Once the company determined that an open-wire line posed difficulties, it turned its attention to underground construction of the conventional pipe design. This probably would have been installed, had not the cable manufacturer at about that time promised to build a 69-kv aerial cable. A restudy settled on the aerial cable. Such a substitute for underground construction where wire lines are either not feasible or too costly has been long sought by the industry.

Systems Double Primary Voltage to Gain Capacity (*Continued from page* 67)

tween the primary-conductor hardware and the neutral or ground wire. Ground wires will not be carried above the neutral. Hardware will be tightened to avoid radio and television interference, and slack spans will be drawn up so that they cannot loosen hardware.

Where shunt capacitors will be required on the higher-voltage lines, two 7.2-kv units will be installed in series until 14.4-kv units are available. The unit on the ungrounded end of the series will be insulated from ground.

As transformers are a major item of conversion expense, changeover has been so planned that maximum use can be made of them. Plans call for conversion without replacement of much of the conductor too, particularly in the early stages. Transmission and substation facilities, where practicable, will be improved without sacrificing equipment life.

Although conclusive cost figures are not yet available and do not include increased transformer capacity, it already appears that the cost of new 14.4/24.9-kv rural lines will be about 10 to 15% more than that of 7.2/12.45-kv lines of the same size. But the higher-voltage lines will quadruple capacity.

Conversion to 20/34.5 and 26.5/46-kv distribution was considered in the studies, but 14.4/24.9 kv appeared reasonably adequate for the loads on systems in the TVA area.

Electric Heating Costs Guaranteed by SMUD (*Continued from page* 71)

uct. "Electric heating" did not seem appropriate because heat pumps also serve this purpose. We finally settled on "Electric Comfort Heat." This is not original with us but was adopted because it had some "sell" in it. However, using this phrase sometimes interferes with the smooth flow of copy in ads or brochures and then we use "electric heat," "modern electric heat," along with frequent use of "Electric Comfort Heat."

We also found it necessary to train electrical contractor personnel in the computation of electric heating installations. This was done in evening sessions utilizing a special slide rule calculator. More intensive training was required for our own utility personnel because they will inspect all installations before guarantee certificates are issued.

Another very essential item was to convince the financial fraternity in our community that they need have no reservations on financing homes having electric comfort heat. This was accomplished in part at a dinner meeting which also included appraisers, VA and FHA officials, city and county electrical inspectors, a number of the larger builders and representatives of the electrical industry. Further follow-up work will be done.

We also set up an incentive sales program for contractor personnel. Funds were provided by participating distributors, the Electric League, and the District.

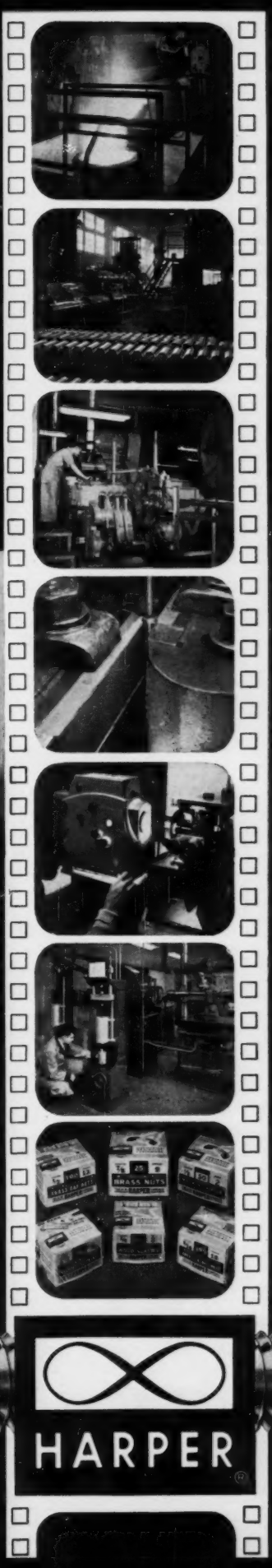
Although it is too early to appraise the full impact of the program, we have had a record of 361 inquiries since the promotion started last December. Completed installations to date total 146, with a connected load of 986 kw. This includes 57 homes where electricity is the sole source of heat and 89 installations of supplementary heating. Construction is underway on 49 homes with baseboard units in one subdivision and the same builder has 53 lots in another location.

Current indications are that the first unit of 86 homes in a development for retired military personnel will be Gold Medallion, the lower priced homes having electric comfort heat, and heat pumps in the larger homes.

Still another builder is applying for FHA commitments on 62 electrically heated homes.

In future years program adjustments will be made as necessary to help assure that 1965 does not see a summer peak 41% higher than the winter peak on our system.

But there is no doubt that the best guarantee of success for our Guaranteed Heating Cost Program is the eraser-eating commitment of our residential sales supervisor.



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. . . fastenings at your fingertips!

Immediately available, from stocks in local distributor and factory warehouses, are millions of fastenings in over 7,000 different sizes, shapes and alloys to meet your critical demands. Harper maintains a constant inventory of more than 150,000,000 bolts, nuts, screws, washers and rivets in over 100 non-ferrous and stainless steel alloys to make this service possible. Even "specials" made to your specifications are promptly processed through Harper's completely integrated operation to meet your requirements. Availability of fastenings is a fact with Harper. Call your local Harper Distributor or branch office today for proof!

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News About People

MITCHELL REES

Mitchell Named Chairman

Dean H. Mitchell has been elected chairman, president and chief executive officer of Northern Indiana Public Service Co. Carl D. Rees became first vice president.

Rees will assist the president in the management and direction of Northern Indiana PS activities.

Mitchell, who has been in the utility field more than 36 years, has been president of Northern Indiana PS for 23 years. Rees was formerly vice president-general operations.

Three Step Into Vice Presidencies at Puget Sound P&L

WALLIN ANDERSON DAVIS

John F. Wallin, J. E. Anderson and Ralph M. Davis have been elected vice presidents of Puget Sound Power & Light Co.

Wallin will be in charge of operations; Anderson, finance; and Davis will continue as secretary.

Wallin will transfer to Seattle to succeed Edward A. Fontaine who resigned to return to Stone & Webster Service Corp.

John H. King, who will continue as controller, was named to replace Anderson as treasurer.

New Orleans PS Elects Sinnott VP

Charles J. Sinnott, general sales manager of New Orleans Public Service Inc, has become a vice president.

Sinnott joined New Orleans PS in 1937 as a commercial sales representative in the general sales department. He has been general sales manager since 1958. He was previously residential sales manager and, before that, general supervisor of the residential division.

◀ SINNOTT

Three Become Vice Presidents at Commonwealth Associates

ELZI WESTRATE ASBURY

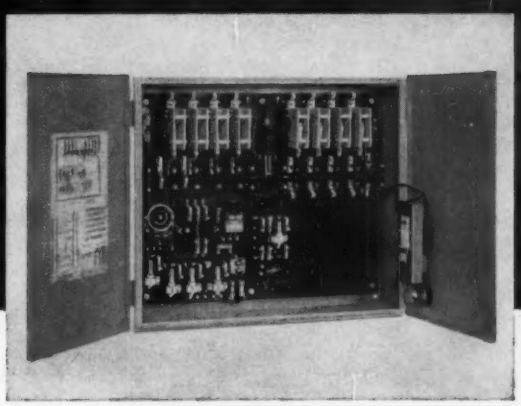
J. A. Elzi, M. C. Westrate, and C. E. Asbury have been elected vice presidents of Commonwealth Associates, Inc.

C. H. Alban and E. Weatherly Jr were named directors, while J. A. Meader was promoted to assistant secretary.

Elzi will continue as engineering administration director, Westrate as treasurer and chief consulting engineer, and Asbury as chief electrical design engineer.

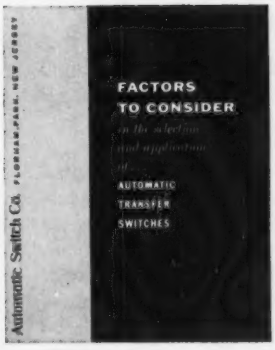
(*More News About People on page* 138)

STOP FALSE STARTS



An ASCO Automatic Transfer Switch with Built-In Time Delay Prolongs Life of Stand-By Equipment

Electrical storms are typical of various disturbances which generate momentary fluctuations in power supply systems. When these fluctuations last less than a second they have no effect on the load, so load transfer to an emergency supply system is not warranted. Yet they are of sufficient duration to actuate a transfer switch, causing needless starting and accelerated wear of emergency power stand-by equipment, *unless there is a built-in time delay.*



The measured response of an ASCO Automatic Transfer Switch means lengthened life for emergency mechanisms, and far smoother service to the connected load. ASCO time delay is built into the circuit selector relay; no extra relays or additional moving parts are necessary. ASCO Transfer Switches are factory-set to your specifications, to trip at any interval between 1 and 3 seconds. Additional features include: wide break distances; positive make ability; and high short time fault current ratings.

The extensive ASCO line of Automatic Transfer Switches with built-in time delay includes one to meet your requirements: 30 to 2000 amperes . . . to 750 volts . . . in standard or special ratings.

Write for Publication 596, an engineering study of adequacy factors to consider in the application of automatic transfer switches, and Catalog 57-S1 which shows you how to select the optimum switch for your application.

ASCO Electromagnetic Control

ASCO

DEPENDABLE CONTROL BY Automatic Switch Co. 50P HANOVER RD., FLORHAM PARK, N. J. • FRONTIER 7-4600 • AUTOMATIC TRANSFER SWITCHES • SOLENOID VALVES • ELECTROMAGNETIC CONTROL

J. R. Kearney Corp Picks Deal as VP-Sales

DEAL ▶

Robert E. Deal has been elected vice president-sales of James R. Kearney Corp, St. Louis, Mo. He will supervise and coordinate sales force activities and will also direct and coordinate the sales and marketing programs.

Deal joined Kearney last year as general sales manager. He was previously manager of marketing for the 3E Co which was acquired by Kearney and is now the corporation's Melrose Park division.

PERSONAL BRIEFS

California Municipal Utilities Assn has picked **Norman E. Woodbury** as its first executive director.

Assistant Secretary **Harry G. Stevens** has retired from Pennsylvania Electric Co. He has been with Penelec and predecessor companies 34 years.

Richard F. Gretsch is the new Housatonic section division manager for Connecticut Light & Power Co.

Jersey Central-New Jersey Power & Light Companies have appointed **Robert O. Brokaw** as assistant general attorney in the legal department. **Richard D. Dalley** became fuel specialist.

D. B. Wheelock has retired as commercial vice president of California Electric Power Co.

Quebec Hydro-Electric Commission has appointed **Piotr Kopczynski** as relay, meter and control engineer of the maintenance section in the regional operation division.

L. Earle Merrow, vice president of Orange & Rockland Utilities, Inc, has been made a director.

Hendon R. Johnston has succeeded **Henry T. Lofft** as Tennessee Valley Authority chief construction engineer. Lofft has recently retired. **Earle R. Wall** has retired as distributor relations advisor for Tennessee Valley Authority's power office. **Arthur P. Brazelton,** manager of TVA's western district, has become manager of Paducah Electric System, following its purchase by TVA from Kentucky Utilities Co.

Texas Power & Light Co has made **George McKinney** a rural development specialist in its new rural development division.

P. W. McAra has been appointed senior resident engineer at Saskatchewan Power Corp's Squaw Rapids hydro project.

United Illuminating Co has elected **Eben Haskell** assistant vice president.

Arizona Public Service Co has named **W. A. Stevenson** supervisor of the utility's power supply and scheduling.

Puget Sound Power & Light Co has transferred **V. O. Burns** to the operations department as executive assistant. He replaced **G. Truman Greenland** who became assistant superintendent at Olympia for the company.

Glenn E. Ronk has been appointed director of marketing at Cornell-Dubilier Electronics division of Federal Pacific Electric Co.

Burndy Corp has named **Herbert H. Rogge** a director and chairman of the executive committee.

Lewis J. Burger has been elected president of LeTourneau Westinghouse Co, Westinghouse Air Brake Co subsidiary. Burger was formerly manager of General Electric Co's switchgear division.

Hubbard & Co has named **Matt Anderson** chief industrial engineer of the Hapco division.

William S. Ginn, former vice president of General Electric Co, has been named assistant to the president in charge of product research at Baldwin-Lima-Hamilton Corp.

Dr F. R. Hensel, vice president-engineering at P. R. Mallory & Co, Inc, has retired.

William L. Moorhead has joined Sprague Electric Co as product manager for ac capacitor sales.

Burroughs Corp has promoted **Donald E. Young** to assistant vice president-general.

In Westinghouse Electric Corp's atomic equipment department at Cheswick, Penn., **A. J. Mei** has been named programs coordinator and **C. E. Anthony** became order service department manager. **Thomas B. Simon** was named manager of room air conditioning engineering for the major appliance division.

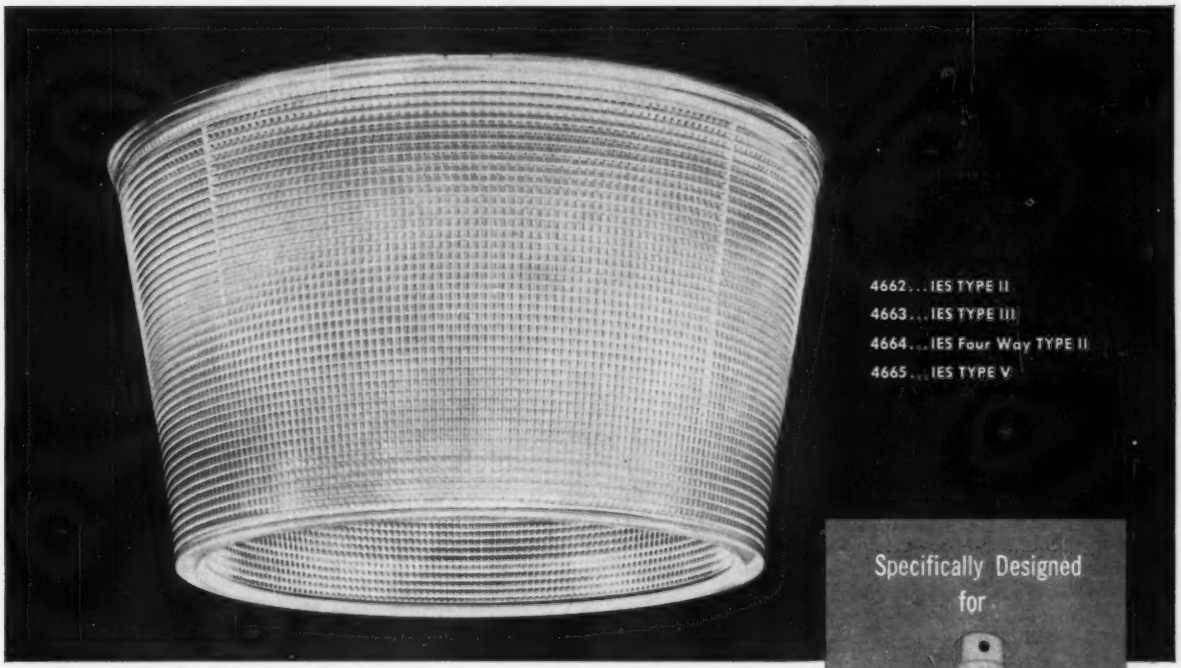
Richard J. Heh has been appointed utility products division manager for Thomas & Betts Co.

General Electric Co has appointed **Randolph L. Houlton** as manager-process automation engineering in the industry control department. **Karl J. Doll** was named manager of the eastern region for GE's service shops department. He will be responsible for 18 service centers in the East, including Boston, New York, Philadelphia, Atlanta, Miami and New Orleans. **Thomas M. Hushen** became manager of GE's New York apparatus service shop.

(*Continued on page* 140)

Outstandingly Successful!

Open-Bottom Refractors by HOLOPHANE



Providing Efficient, Economical Illumination of Residential and Suburban Streets • Shopping Centers • Parking Lots • Industrial and Institutional Grounds

Another important contribution to lighting progress... HOLOPHANE Open Bottom Refractors are resistant to thermal shock, unaffected by weather conditions, present crisp, modern appearance. Their prismatic glass construction permits ideal distribution for each specific purpose.

Check these 5 Important Advantages:

1. ***High Utilization Efficiency*** ... Prismatic control puts more light on street or roadway.
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4. ***Greater Economy*** ... Less units needed for maximum light ... More illumination per dollar.
5. ***Easy, Low-Cost Maintenance*** ... Open bottom permits simple, quicker relamping and cleaning.

Just off Press! Write for 24 Page Book "Street Lighting Design and Application."

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NEW GENERAL ELECTRIC

Transistorized Analog

FREQUENCY TELEMETERING OFFERS GREATER SPEED OF RESPONSE, INCREASED ACCURACY

Now available! General Electric's all-new Analog Frequency Telemetering System provides greatest possible *FLEXIBILITY* to meet utility load dispatching and industrial data transmission applications.

Universal design can be easily modified for varying applications resulting in system simplicity and flexibility. Manufacturing standardization assures quick delivery.

Optional plug-in audio-tone equipment permits transmission of data over voice or microwave channels where tone frequencies are required. Optional tone transmitter and receiver offer forty different tone frequencies available with conventional shift-type operation.

Completely transistorized system has *no* vacuum tubes. Telemeter transmitter, tone transmitter and receiver use only transistors in their circuitry. Telemeter receiver utilizes only diodes.

Compact System rack mounts—conserves valuable panel space.

Plug-in application adapters determine input range and output signals for both the transmitter and receiver. Plug-in filters and transformers select tone frequencies.

Combined accuracy of transmitter and receiver is ±0.5 percent of full span over these variations: ± 15°C temperature, ± 5 percent voltage change, ± 3 cycles frequency. A combined accuracy of ± 1 percent of full span is assured even when the transmitter is subjected to −20 to 55°C or ± 10 percent voltage change.

System stability—±0.5 percent of full span in six months plus ±0.1 percent of full span per each subsequent six months.

Quick response—system speed of response is rated 1 second for 99 percent of scale range—practically instantaneous. Such response is invaluable in applications involving load-frequency control wherein high-speed response is essential. In addition, there is no overshoot.

For utility telemetering in transmitting rapid fluctuation of electrical quantities such as watts, vars, volts and amperes . . . for fast positive transmission of industrial process data including quantities of pressure, temperature, liquid level, flow and many others . . . check into the cost saving advantages of G.E.'s new Analog Frequency System today. Your nearest G-E sales representative will be glad to provide you with additional information on this all-new low cost system. Be sure to ask for bulletin GEA-7163, or write direct to General Electric Company, Section 599-07, Schenectady 5, N. Y.

INSTRUMENT DEPARTMENT

GENERAL ELECTRIC

A new systems operation, with **Thomas I. Paganelli** as its head, has been established in GE's heavy military electronics department. **Robert J. Brown** is the new general manager of the department, succeeding **John J. Farrell** who became consultant to the vice president and general manager of the defense electronics division.

Roy H. Hainsworth has been named assistant to the director of electrical market sales at Reynolds Metals Co.

General Precision, Inc, has named **John R. Harkness** to the newly created post of vice president-marketing for Librascope division.

Line Material has named **J. Brady Stoughton Jr** south Atlantic region manager, succeeding the late **R. C. Hunt.**

Keller Succeeds Franck As Holophane President

Clarence C. Keller (photo) has been elected president of Holophane Co. Charles Franck, president since 1929, will continue as chief executive officer and chairman. Keller has been with the company since 1929. He advanced at Holophane and has served as vice president in charge of sales and, most recently, executive vice president.

Flanagan, Vice President Of Florida Power, Dies

Jene Kenneth (Pat) Flanagan, vice president in charge of public relations for Florida Power Corp, has died following a heart attack. He was 59 years old. Flanagan joined Florida Power in 1942. In 1957 he was made a vice president and placed in charge of public relations.

SALES ASSIGNMENTS

COMPANY STAFFS

James R. Kearney Corp has named John J. Klosin Northeastern regional sales manager, operating from Newark, N. J.

Elliott Co has made Harlan P. Hostetter Western regional manager, with headquarters in San Francisco. He handles sales in eight Western states.

General Electric Co has named Edward F. Coakley New England district sales representative, silicone products department. He has headquarters in Boston. J. William Houtz became east central district sales representative for the department. He has offices in Cleveland. Samuel H. Thomas was named New England sales manager and Charles W. Billings became Cleveland area sales manager, both for generation, transmission, and auxiliary district sales within the electric utility sales operation. The new district sales manager representing GE's semiconductor products department in Virginia and North Carolina is Joseph Almeida. Roy H. Mitchell became manager of electric utility district sales in the Connecticut area.

De Laval Separator Co has appointed R. E. LeMire district manager in St. Louis. He will handle sales for the industrial division and will be assisted by O. H. Jacobsmeyer Jr. Wayne Patterson, R. A. Street, and Robert E. Wood became sales engineers to handle Midwestern territories.

Philco Corp has opened a new sales office in Detroit for its Lansdale division. Lester V. Ostrander Jr is sales engineer in charge of the office.

Riley Stoker Corp has named F. R. Callowhill Eastern sales manager.

Simplex Wire & Cable Co has appointed Edward F. Galvin field sales manager in the marketing division.

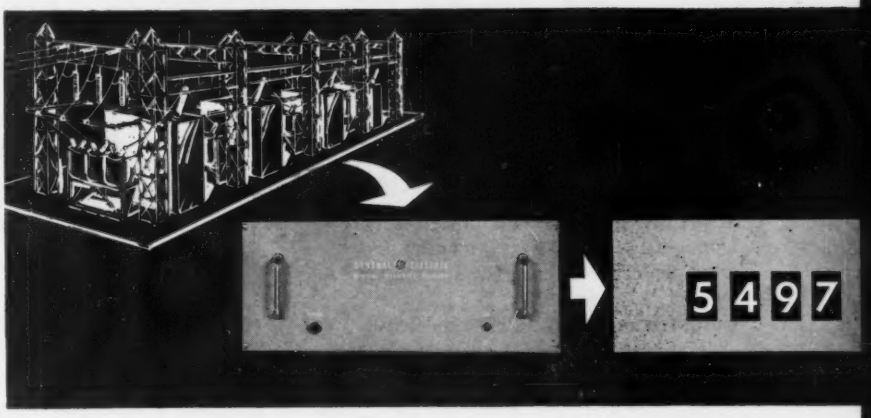
REPRESENTATIVES

Thiel Tool & Engineering Co, Inc, in expanding its pole line hardware line, has assigned the following representatives: Waterman & Waterman and Bassett-Eischen. The following Thiel fastener agents will also represent the hardware line: Darger Co; Keeler-White Co; Gordon Laurson & Son; M. Levin; Charles McFee; Kenneth McIsaac; Riecher Electrical Sales; Texas Sales Representatives; and Nulik-McCormick Co.

NEW GENERAL ELECTRIC

Digital Telemetering

SYSTEM FOR FAST,
HIGH ACCURACY
DATA TRANSMISSION



For fastest, most accurate utility load or billing information, General Electric's all-new Digital Telemetering System brings kilowatt-hour information into load dispatching office over one channel, with *100 PERCENT ACCURACY*. Offers outstanding system values . . .

Flexibility: Digital telemetering signal can be time-multiplexed with an analog telemetering signal at a preset time interval, thus providing minimum channel expense and lower operating costs. Or the digital telemetering system can be used over its own isolated channel to transmit information on command. This system will also operate over any intermediate channel equipment capable of accommodating standard analog "frequency" telemetering signals.

Accuracy: Digital receiver self-checking feature permits only the read-out of correct numbers.The receiver will cancel the readout if there has been an incorrect code or interference of the coded signal during transmission.

Speed: Digital transmission is in the form of long and short pulses at average rate of 10 cps. A six digit number can be telemetered in less than five seconds.

Design: System utilizes time-proved relays and stepping switches that require minimum maintenance. No tubes or transistors are used. Equipment is furnished in 19-inch rack, dust-proof cases with slide-out drawers.

Cost: System price is usually less than the cost of comparable integrating devices which it now obsoletes.

Various read-out devices are available depending on your requirements. These include: electric typewriter, visual digital display units and tape punch equipment if you wish to use the information in a digital computer. Digital transmitters and receivers can be provided for either 4, 6 or 8 digit numbers.

For additional information on the all-new G-E Digital Telemetering System, just call your nearest General Electric sales office, ask for a copy of bulletin GEZ-3312, or write direct to General Electric Company, Section 599-07A, Schenectady 5, N. Y. In Canada, contact Canadian General Electric Company Ltd., 940 Lansdowne Avenue, Toronto 4, Ontario.

INSTRUMENT DEPARTMENT

GENERAL ELECTRIC

Naughton, Dominy Clash in Debate

An investor-owned utility spokesman and federal government advocates of public power waged a war of words during a recent debate at Salt Lake City.

The issue was whether the federal government should build transmission lines to wheel Upper Colorado River power at taxpayers expense or if private utilities should construct the lines.

E. M. Naughton, president of Utah Power & Light Co, told a session sponsored by the Utah Democratic State Committee that "key issue is expansion of public power and that the plan of the United States Bureau of Reclamation in the Upper Colorado River work is a reactivation of a program initiated by the late Secretary of Interior Harold Ickes to socialize the electrical power industry."

Floyd E. Dominy, commissioner of the Bureau of Reclamation, said he would be happy to be associated with the late Mr. Ickes who, he asserted, "always acted in the public interest."

Dominy said that the federal government would never again decide "not to build a dam simply because it's only a power project. Our main point of interest will be to sell power cheaply to the public" through expenditure of federal funds for public power projects.

He said his bureau was authorized by law to build single purpose power projects.

Naughton said if this is Dominy's policy, then the agency ought to change its name from the "Bureau of Reclamation" to the "Bureau of Public Power."

Dominy rejoined that the decision of the federal government to build backbone transmission for the Upper Colorado River states projects was a bi-partisan one—having been made first by then Interior Secretary Fred A. Seaton, a Republican, and reaffirmed by Interior Secretary Stewart Udall.

Naughton said that neither cabinet member knew much about the power industry and that both had acted on Dominy's recommendations. "I fail to find anything significant in the fact Mr. Dominy hasn't changed his mind," he asserted.

Dominy's contentions on the transmission issue were as follows: 1) If the government builds the two-thirds of the transmission system in question, cost of the project could be paid off in 44 years with a smaller outlay than would have to be paid to private utilities for wheeling the power; 2) Payment to the utilities for wheeling the power would amount to $610 million over next 86 years; that the government can build the entire $286-million system after making a $324-million allowance for federal and local taxes which the utilities would pay.

Naughton made no 86-year projections of dollar results, but maintained that the bureau can pay the wheeling charges offered by the utilities instead of spending federal funds to build the system and repay the investment five years earlier; that out of the wheeling charges, the utilities would pay in the 86-year period $100 million in federal taxes and $184 million in state and local taxes in the five western states involved in the project; that it is possible for the utilities to pay these taxes and do the job cheaper than the government because the utilities must build the lines anyway to handle 20 million kilowatts by 1980 and the project power would amount to only 1¼ million kw.

New Feasibility Standard Delayed

The Kennedy Administration's push to establish a new feasibility standard for federal public works projects has been delayed a little but should still be finished this year.

A new standard—replacing the present "A-47" standard—probably would be drawn up by the Budget Bureau. However, there's a slight possibility that this might be done by another, possibly new, agency.

The delay has come in the filing of recommendations by several consultants hired by the Budget Bureau. This report, first due June 1, is now expected to be submitted by the end of June. Consultants are Maynard Huffschmidt, Harvard University professor; Steven Margolin, Huffschmidt's assistant; Julius Margolis, University of California (Berkeley) economist; and John Krutilla, Resources for the Future, Inc.

After the consultants file their recommendations, the Administration must decide what agency will then proceed to draw up the new standard. The Budget Bureau issued the previous standard and hired the consultants this time. But an internal fight is going on within the Administration as to what sort of natural resources advisory unit should be established, and this fight could lead to a shift from the Budget Bureau to another agency.

The fight turns on whether an independent resources council should be created in the White House (as Senators Clair Engle (D-Calif.) and Gale McGee (D-Wyo.) have proposed in legislation); or whether the Budget Bureau and the existing Council of Economic Advisors should handle resources planning (as President Kennedy presently feels).

Legislation in the Senate Interior Committee to create an independent resources council has been stalled while the White House fight goes on (EW, April 24, p43). The President's recent request to the House Appropriations Committee for fiscal 1962 funds to expand resources planning activities in both the Budget Bureau and the Council of Economic Advisors gave indication that the President was winning the argument (EW, May 29, p45).

A new administrative policy of project feasibility wouldn't require legislation on Capitol Hill. But, because of its controversial nature, the new standard certainly would be brought up for debate in Congress before adoption.

The new standard is expected to call for: **(1)** longer pay-out period —up to 100 years, perhaps; **(2)** inclusion of more non-paying benefits in determining project feasibility—recreation and improved property values are among them; **(3)** less emphasis on power allocations to pay for the project—effectively increasing the possibility of power projects and also reducing federal power rates at these projects.

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American Society for Testing Materials—Annual Meeting, Chalfonte-Haddon Hall Hotel, Atlantic City, June 25-30.

Canadian Electrical Association—71st Annual Meeting, Banff Springs Hotel, Banff, Alta., June 26-28.

• **Electric Companies Public Information Program** — Mid-Atlantic Regional Meeting, Biltmore Hotel, New York, June 29.

JULY

National Society of Professional Engineers—27th Annual Meeting, Olympic Hotel, Seattle, Washington, July 4-7.

• **Edison Electric Institute**—Industrial Relations Committee, Roosevelt Hotel, New York City, July 20.

AUGUST

• **Western Electronic Show & Convention**—Cow Palace, San Francisco, Aug. 22-25.

• **American Institute of Electrical Engineers**—Pacific General Meeting, Hotel Utah, Salt Lake City, Aug. 23-25.

• **American Society of Mechanical Engineers**—International Heat Transfer Conference, University of Colorado, Boulder, Aug. 28-Sept. 1.

• **American Institute of Mining, Metallurgical, & Petroleum Engineers**—Third Annual Semiconductor Conference, Ambassador Hotel, Los Angeles, California, Aug. 30-Sept. 1.

SEPTEMBER

• **Association of Illinois Electric Cooperatives** — Members Annual Meeting, Springfield, Illinois, Sept. 6-8.

• **Northwest Public Power Association**—Power Use Section, Annual Workshop, Pacific University, Campus, Forest Grove, Oregon, Sept. 6-8.

• **National Rural Electric Cooperative Association**—Region IV Meeting, Columbus, Ohio, Sept. 7-8; Region V Meeting Eau Claire, Wisconsin, Sept. 11-12; Region III Meeting, Alabama, Sept. 25-26; Region I Meeting, Richmond, Virginia, Sept. 28-29.

• **Rocky Mountain Electrical League**—Annual Fall Convention, Jackson Lake Lodge, Moran, Wyoming, Sept. 10-13.

• **Edison Electric Institute**—AGA, Accounting Section Organization Meeting, The Netherland Hilton Hotel, Cincinnati, Ohio, Sept. 11-12; Meter and Service Committee, Hotel Leland, Springfield, Illinois, Sept. 24-27; Industrial Relations Committee, Annual Round Table Conference, Drake Hotel, Chicago, Sept. 25-27.

• **Engineering Management Meeting** — Sponsored by AIEE, ASME, Hotel Roosevelt, New York City, New Orleans, Sept. 14-15.

• **Public Utilities Association of Virginia**—43rd Annual Meeting, The Greenbrier, White Sulphur Springs, W. Virginia, Sept. 14-16.

• **American Institute of Electrical Engineers**—Petroleum Industry Conference, Jung Hotel, New Orleans, Sept. 17-20.

Electrical World's Fifth Electric Heating Conference — Sheraton-Park Hotel, Washington, D. C., Sept. 25-26.

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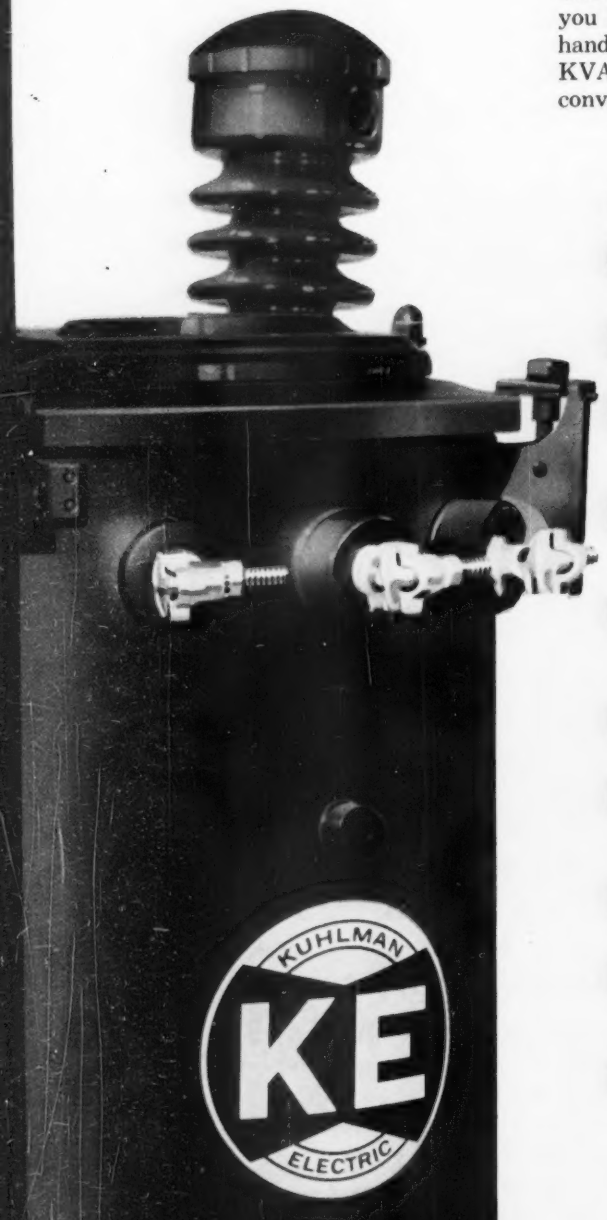

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